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TYPHOIDAL CHOLECYSTITIS AND CHOLELITHIASIS.

REPORT OF A CASE WITHOUT PREVIOUS HISTORY OF TYPHOID FEVER, AND DISCUSSION OF A POSSIBLE AGGLUTINATIVE REACTION IN THE BILE AND ITS RELATION TO STONE FORMATION.

By Harvey W. Cushing, M. D., *Resident Surgeon in the Johns Hopkins Hospital.*

Suppurative cholecystitis, since the time of Louis, has been recognized as one of the complications of typhoid fever. That it is definitely caused in most cases by infection with the bacillus typhosus was not demonstrated until long after Eberth and Gaffky's discovery of that organism and the recognition of it as the ætiological factor in many of the other suppurative sequelæ of enteric fever.

Since the original report by Gilbert and Girode* (1890) of a case of cholecystitis caused by the invasion of the bacillus typhosus, as demonstrated by cultures, a series of most important observations, concerning the relation of typhoid fever and gall-bladder affections, has been made by investigators in various places. The quite constant occurrence of the bacilli in the gall-bladder in cases of experimental inoculation typhoid in rabbits was first noticed by Blachstein† (1891) in Professor Welch's laboratory, and attention was called to the persistence of the organisms in this situation in these animals subsequently by Professor Welch* himself. In one case the observation was made on the 128th day after the inoculation, the bacilli having disappeared from every other organ of the body. This demonstration in 1891 led to the routine examination bacteriologically of the bile in fatal cases of typhoid at this hospital, and Dr. Flexner found in 50 per cent. of the cases a pure culture of typhoid. Clinically these organisms may be present without producing any apparent symptoms. A variety of changes, however, may be set up at any time following their invasion, from simple catarrh with stone formation, to ulceration, perforation or general peritonitis; a sequence such as is more commonly seen in appendicular disease, the two having many features in common.

Acute suppurative cholecystitis, as recently emphasized by many writers (Mason,† Osler‡ and others), is a not uncommon

*Gilbert and Girode, Contribution à l'étude bacteriologique des voies biliaires. Comptes rendus de la Société de Biologie, 1890.

†A. G. Blachstein, Intravenous inoculation of rabbits with the bacillus coli communis and the bacillus typhi abdominalis. Johns Hopkins Hosp. Bulletin, 1891, Vol. II, p. 96.

*Wm. H. Welch, Additional note concerning the intravenous inoculation of the bacillus typhi abdominalis. Johns Hopkins Bulletin, 1891, Vol. II, p. 121.

†A. L. Mason, Gall-bladder infection in typhoid fever. Trans. of Assoc. of Am. Phys., 1897, Vol. XII, p. 23.

‡Wm. Osler, Hepatic complications of typhoid fever. Trans. of Assoc. of Am. Phys., 1897, Vol. XII, p. 378.

complication of a late stage of typhoid fever of the usual clinical type. In some of these cases there has been an associated cholelithiasis, but from a study of the reports obtainable it would seem that only a small percentage of cases with this complication during the fever were associated with gall-stones; a percentage no greater than could be accounted for by preformed stones.*

There seems, however, to be a distinct group of cases in which acute cholecystitis has appeared, not during the fever, but some months after it, and in all of these has there been an associated cholelithiasis. Bernheim† (1889) first called attention to the frequency of gall-stone attacks following typhoid, and Dufourt‡ (1893) found a history of typhoid, preceding gall-stone attacks by a few months, in 19 cases. A review of the cases of cholecystitis admitted in this Hospital to Prof. Halsted's service and subsequently operated on and gall-stones found, shows that 10 out of 31 gave a previous history of typhoid, the interval varying from a few months to twenty years.§ In none, however, but the present case was Eberth's bacillus demonstrated.

Further, in 1890, Professor Welch‖ demonstrated the presence of micro-organisms in the centre of gall-stones and suggested that they might have been the starting point for the deposition of the biliary salts. It has been mentioned, however, that calculi are usually not associated with early cases of acute typhoidal cholecystitis despite the great abundance of organisms in the viscus. In the one case, which we have observed in this early stage at operation, the organisms have been free and very motile; in the later cases, however, a distinct clumping of the bacilli in the bile has been noted. Attention was called to these clumps of bacilli by Blachstein, though no importance was attached to them. Richardson* found this condition in a single case and regarded it as a gigantic serum-reaction in the gall-bladder. Nichols, working in Professor Welch's laboratory on experimental typhoid in rabbits, has noted the very early appearance of the bacillus in the gall-bladder after intravenous inoculation, and the subsequent distinct clumping of the organism in those animals which have later come to autopsy.

These observations naturally lead to the hypothesis that a reaction akin to an agglutinative reaction of the organisms, as Richardson has suggested, may take place in the course of time in the bile, the clumps being the starting point for the deposition of the bilirubin calcium salts and the origin of stone, the symptoms of which occur subsequent to convalescence.

The occurrence of this post-typhoidal cholecystitis, therefore, may be readily explained by the above series of observations, summarized as follows: (1) the bacilli during the course of typhoidal infection quite constantly invade the gall-bladder; (2) the organisms retain their vitality in this habitat for a long period; (3) in the course of time the bacilli are almost invariably found to be clumped in the bile, suggesting the occurrence of an intravesical agglutinative reaction; (4) these clumps presumably represent nuclei for the deposit of biliary salts, as micro-organisms may with regularity be demonstrated in the centres of recently formed stones; (5) gall-stones being present in association with the latent, long-lived, infective agents, an inflammatory reaction in the viscus of varying intensity may be provoked at any subsequent period.

The writer has been able to collect but 4 cases of post-typhoidal cholecystitis associated with stones, in which the bacillus typhosus has been cultivated from the bile at operation. To these, two additional cases are given (cf. Table I).

This sequence apparently may not be limited solely to infection with Eberth's bacillus. In Blachstein's report a similar clumping was observed in the bile of rabbits after inoculation with the bacillus coli communis. Dr. Flexner found the bacillus coli communis present in the bile in a small percentage of fatal cases of typhoid in the human, and in a few of the hospital cases of post-typhoidal operation for gall-stones a pure culture of colon has been isolated from the gall-bladder. Gilbert and Fournier,† as a result of their experimental researches, have divided biliary lithiasis into two great pathological groups: lithiasis due to colon, by far the most common, and lithiasis due to typhoid. Mignot

* Prof. Osler (loc. cit. p. 396) suggests that preformed stones may be an ætiological factor in the production of cholecystitis during the fever, as they would render the ducts more receptive of infection. Naunyn (A Treatise on Cholelithiasis, 1896) and Hunter (A Discussion on Cholelithiasis, etc., Montreal Medical Journal, December, 1897) believe in the possibility of a rapid formation of stone following infection. Gilbert et Fournier (Du rôle des Microbes dans la genèse des Calcules biliaires: Compt. rendus heb. de la Soc. de Biologie, 1896, p. 145) have called attention to the fact that there may be different groups of calculi of various ages, old stones which have sterile centres and recent new formed stones from the nuclei of which positive cultural results may invariably be obtained. The presence of old stones therefore at times may possibly court the infection which leads to the formation of a new group of calculi and associated cholecystitis. Statistics, however, seem to indicate, that of the acute cases, both those operated on during the course of the fever, and those dead of the fever in which acute gall-bladder infection has been found at autopsy, only a small percentage are associated with the presence of calculi. Courvoisier (Casuistisch-statistische Beiträge zur Pathologie und Chirurgie der Gallenwege, Leipzig, 1890) gives in 10 fatal cases of typhoid cholecystitis only two with gall-stones. Hagenmüller (Cholecystitis in Typhoid Fever, Thèse de Paris, 1876) in a comprehensive study reports 18 cases with death in 16 from fatal peritonitis, of which number there were only two with gall-stones.

† Bernheim, Art. Ictère du Dict. Dechambre, 1889.

‡ Dufourt, Infection biliaire et lithiase, sc. Revue de Méd. 1893, p. 274.

§ This long interval would, however, not necessarily rule out an association with the primary infective agent, for in v. Dungern's case (Ueber Cholecystitis Typhosa, Münch. Med. Woch., June 29, '97) fourteen years elapsed between the original attack and the perforative cholecystitis when the bacillus typhosus was isolated.

‖ Also Naunyn ("Treatise on Cholelithiasis," New Syd. Soc., 1896, p. 51). Also Hanot (quoted by Dauriac, Gaz. Heb. de Méd. et de Chirurg., July 25, 1897). Cf. also Gilbert et Dominici (La lithiase biliaire est-elle de nature microbienne? Soc. de Biologie, 1894, p. 485).

*A case of cholecystitis due to the typhoid bacillus. Boston Medical and Surgical Journal, Dec. 16, 1897.

† Gilbert et Fournier. Lithiase biliaire expérimentale. Compt. rend. Soc. de Biol., Nov. 5, '97, p. 936.

and these writers have reproduced, experimentally, in guinea-pigs and rabbits conditions representing cholelithiasis of these two types. The writer recently operated on one of the cases of this colon group two years after a preceding typhoid. The gall-bladder contained a multitude of small faceted stones in the centres of which faintly staining bacilli could be demonstrated on cover-slip preparations, though cultures from the centres of the stones were negative. The bile contained a few isolated organisms and many small clumps of bacilli. They possessed the cultural properties of the bacillus coli communis. The patient's blood serum gave an active Widal reaction to typhoid in dilution of 1 to 30. It also gave a slow but distinct clumping reaction with the bacillus which was isolated (cf. Table II).

TABLE I.—*Collected cases of post-typhoidal Cholecystitis associated with Gall Stones which have been operated upon and the bacillus typhosus isolated.*

	AUTHOR.	SEX.	AGE.	HISTORY.	OPERATION.	CONTENTS OF GALL BLADDER.
I.	Gilbert and Girode, Comptes Rendus de la Soc. de Biologie, 1893, p. 95.	F.	45	Gall-bladder symptoms during fever. Subsequent gall-stone attacks.	Operator, Ferrier. Cholecystectomy 5 mos. after fever.	Bac. typhosus, pure. Gall stone. Purulent fluid.
II.	Duprè (Chantimesse's Case), Les infections biliaires. Paris Thèse, 1891.	F.	45	No attack with fever. Subsequent gall-stone colic.	Cholecystenterostomy 8 mos. after fever.	Bac. typhosus, pure. Gall stone.
III.	v. Dungern, Münch. Med. Woch., June 29, '97.	F.	46	No attack with fever. Subsequent cardialgia. Periostitis of lower jaw in 13 yrs. with bac. typh. Acute gall-bladder attack in 14th year. Widal reaction positive.	Operator, Kraske. Cholecystostomy with evacuation of abscess 14 yrs. after fever.	Bac. typhosus, pure. No stone found, but "probably present." Abscess.
IV.	M. W. Richardson, Bost. Med. and Surg. Jour., Dec. 16, '97.	F.	50	Recent uncertain history of typhoid. Serum reaction positive.	Operator, M. W. Richardson. Cholecystostomy.	Bac. typhosus, pure. Brownish fluid with bacilli in clumps. Gall stone in cystic duct.
V.	Surg. No. 3835, Jan'y 28, '95.	F.	37	Uncomplicated typhoid 3½ mos. ago. Gall-stone colic with jaundice three weeks ago. Recent peritonitis.	Operator, Prof. Halsted. Cholecystostomy.	Empyæma of ruptured gall-bladder which contained numerous small stones. Bacillus typhosus.
VI.	Writer's Case, Surg. No. 6339, Mar. 16, '97.	F.	26	No history of typhoid. Serum reaction positive.	Operator, Prof. Halsted. Cholecystostomy.	Bac. typhosus, pure. Brownish fluid, bacilli in clumps, gall stones.

Several other post-typhoid cases have been reported without bacteriological notes. These are omitted.

TABLE II.—*Similar post-typhoidal cases from the Johns Hopkins Hospital surgical records in which the bacillus coli communis has been isolated.*

		DATE.	SEX.	AGE.	HISTORY.	OPERATION.	CONTENTS OF GALL BLADDER.
I.	Surg. No. 3805.	1895	M.	30	Gall-bladder symptoms during fever. Frequent attacks of colic since.	Prof. Halsted. Cholecystostomy 14 mos. after fever.	Mucoid fluid. Thirty calculi. Bac. coli com. pure.
II.	Surg. No. 4438½.	1895	F.	57	Preceding typhoid, subsequent attack of acute cholecystitis 7 mos. ago.	Bloodgood. Cholecystostomy.	Muco-purulent material. Impacted stones. Bac. coli communis.
III.	Surg. No. 4956.	1895	F.	29	Attack during convalescence.	Bloodgood. Cholecystostomy 7 mos. after fever.	Purulent fluid. Bac. coli communis. Subsequent discharge of a stone.
IV.	Surg. No. 4411.	1895	F.	34	No symptoms during fever. First attack 18 mos. later. Three subsequent ones.	Bloodgood. Cholecystostomy 2 yrs. after fever.	Bile-stained fluid. Seven stones. Bac. coli communis.
V.	Surg. No. 7619.	1898	F.	24	"Typhoid-pneumonia" (?) First attack 6 mos. later. Subsequent frequent attacks of gall-stones. Serum reaction positive to typhoid.	Cushing. Cholecystostomy 2 yrs. after fever.	Bile-stained fluid. Countless small faceted stones. Clumps of rod-shaped bacilli. Bac. coli communis pure.

Cases, in which bacteriological notes were incomplete, have been omitted.

Most extraordinary, however, is it to find in cholecystitis associated with stones, the presence of Eberth's bacillus when there has been no history of previous typhoid fever, and when the gall-bladder infection seems to be primary, as in the case to be reported.

The widespread occurrence of the bacillus typhosus has but lately been fully recognized, and owing to the definiteness of the serum reaction many cases are clinically recognized as typhoidal infection which have few of the classical symptoms and which at autopsy may be found free from intestinal lesions. Guarnieri* (1892) first described an infection of the biliary passages, liver and spleen with the bacillus typhosus in a case without intestinal lesions. The patient, however, had the clinical symptoms of typhoidal infection. Chiari's† grouping of the cases of typhoid without intestinal lesions gives no division which would include a case the sole apparent lesion of which is in one organ and which clinically never presented any indications of typhoid.

The history of the case is as follows:‡

Mrs. C., æt. 26; entered Professor Halsted's service at the Johns Hopkins Hospital, March 5, 1897, complaining of pain in the right hypochondrium.

The *family history* was negative.

The *personal history* was also without particular note. She had had the usual infantile diseases, and with the exception of an attack of pneumonia ten years before entrance she had led a vigorous and active life. She had been subject since childhood to attacks of indigestion and prolonged constipation. She is evidently a careless eater and has had for the past three years occasional attacks of vomiting, usually in the morning after eating too heartily the night before. Her diet has been execrable: coffee, 6 or 8 cups a day; she is especially fond of pastry, acid things, pickles, salads and the like. Her menstrual history is normal. She has been married five years; has had one still-born and one living child now aged 2 years. There has been absolutely no history of any preceding febrile attack. (Patient and friends were closely questioned about this several times. She lived in the country with no near neighbors; she knew of no one in the vicinity who had had typhoid or any continuous fever.)

Present Illness. Five days before entrance, after an enormous dinner of beefsteak and gravy, the patient was seized at 11 p. m. with pain in the right hypochondriac region. This continued until the next morning, when after eating breakfast she vomited both her breakfast and the dinner of the preceding day. The quantity she thinks was large—at least 2 quarts. Soon after her pain became very severe and required morphine for its relief, and since then she has suffered from more or less constant pain under the right costal margin. It is not paroxysmal and does not radiate. It is described rather as a soreness than as an actual pain. There has been no vomiting since the first attack; no jaundice has ever been observed. The physician who brought the patient to the hospital states that during the attack she has had some pyrexia, which on the third day reached 102°.

Physical Examination. A large, dark-complexioned woman, well developed and nourished; without jaundice. Pulse regular, 90, of good quality. Temperature 101°. Examination of chest negative. The abdomen was full, slightly tympanitic. There is a distinct rigidity of the right rectus muscle and considerable tenderness in the right hypochondrium. An indistinct tumefaction below the costal margin could be felt on deep palpation. There was tympany over this area. No increase in hepatic dullness; spleen not palpable.

Subsequent History. On the second day after admission the temperature fell to 99°. Her bowels had been freely moved and she was fairly comfortable. Abdominal tympany had disappeared and the spasm in the right upper quadrant of the abdomen was much less. On the third day the temperature was normal; there was no rigidity, no tenderness. A hard, movable mass was palpable in the right hypochondrium; tender only on the deepest pressure. The urine contained no albumen, no bile pigment. The patient was up and felt so well that she was anxious to go home. From this time she was free from subjective symptoms. A smooth roundish mass of about the size and feeling like a movable kidney, readily obtained bimanually and on deep inspiration easily grasped in the hand, persisted in the right hypochondrium. It was absolutely without tenderness.

On the 16th day Professor Halsted operated. A brief report of the operation is as follows:

Cholecystostomy. Greatly enlarged gall-bladder with recent adhesions and containing gall-stones. Evacuation of contents. Permanent drainage.

A vertical incision was made, 15 cm. long, over the site of the tumor and through the right rectus muscle. The peritoneal cavity was opened, disclosing a distended gall-bladder held by recent adhesions to the liver and omentum. Cultures were taken from these adhesions before separating them. Gall-stones were palpable through the bladder walls and in the cystic duct.

The fundus of the gall-bladder was incised and a small amount of brownish mucoid material, unlike bile, was evacuated with fifteen dark green, smooth faceted gall-stones varying in size from a pea to a large chestnut. Cultures were taken from the interior on making the first incision into the gall-bladder. One of the largest stones was impacted in the cystic duct, from which it was dislocated with considerable difficulty. The deeper ducts were free from stones. A purse string catgut suture was taken about the opening in the fundus, into which a drainage tube surrounded by gauze was inserted. The margin of the opening was then anchored to the neighboring peritoneal edges by fine silk mattress sutures. The rest of the abdominal wound was closed in the usual fashion. Her convalescence was uninterrupted. There was a constant profuse discharge of bile. The drainage was

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*Guarnieri, Contributio alla patogenisi delle infezione biliari. Revista generale italiana di clinica medica, 1897. Ref. Baumgarten's Jahresbericht, 1897, p. 234.

†Chiari und Krause, Zur Kenntnis des atypischen Typhus abdominalis resp. der reinen "Typhösen Sephthämie." Zeit. für Heilkunde, Bd. XVIII, S. 471, Oct. 1897.

‡Preliminary mention of this case has been made by Dr. Osler, loc. cit., p. 396.

omitted on the tenth day and the wound had closed on the twenty-sixth.

Bacteriological Report. Cultures and cover-slips from adhesions about the gall-bladder were negative. Cover-slips from the contents of the gall-bladder show a few rod-shaped organisms with rounded ends.

Report on cultures taken from contents of gall-bladder at operation, March 16, '97:

March 17. (A) Cultures taken on agar slants show in 18 hours, twenty or thirty opalescent, separate, whitish colonies. In the water of condensation an abundance of actively motile bacilli. Some very long forms.

March 18. (B) Bouillon inoculation from water of condensation of A gave in two days an abundant cloudy precipitate. No indol reaction obtainable. (C) Gelatine roll from B shows in 24 hours many brownish granular non-liquefying round colonies with a ground glass appearance on surface growth.

March 19. Cultures were taken from a single colony of C and controlled by others from an isolated colony of original agar slant A, as follows: (D) Inoculation on agar shows in 18 hours an abundant opalescent growth of actively motile bacilli morphologically like typhoid. They decolorize by Gram's method. (E) Sugar agar. No gas production. (F) Potato. An invisible membranous growth. (G) Litmus milk. Slightly acidulated. No coagulation.

March 30. A comparative series of cultures were made from a single colony of the original agar slant A, and as a control an undoubted typhoid bacillus, obtained by Dr. Carter in the pathological laboratory at a recent typhoid autopsy, was used. A variety of media were inoculated from both of these sources with precisely similar results.

April 3, '97. *Serum Reactions.* The patient's blood serum produces a distinct and rapid agglutinative reaction of the original organism and of the control, both obtained from agar slants four days old.

The blood serum from a case of typhoid fever in the medical wards produces a similar reaction with both organisms. Blood serum obtained from a healthy adult produces no clumping or loss of motility in either case.

Conclusion. A bacillus with the morphological and cultural properties of the typhoid bacillus.

The Widal test is positive both with the serum from the patient and that from a clinically typical typhoid.

THE PRESENCE OF THE BACILLUS TYPHOSUS IN THE GALL BLADDER SEVEN YEARS AFTER TYPHOID FEVER.

BY G. BROWN MILLER, M. D., *Assistant Resident Gynecologist.*

The case which I report gave the following history:

Mrs. L. P., white, aged 37 years, was admitted to the public gynecological ward of the Johns Hopkins Hospital, Feb. 1, 1898, complaining of pain in the right hypochondriac region.

Family History. Negative.

Past History. She had croup and whooping cough as a child, but was otherwise healthy until the present illness.

Her menses appeared at the 16th year and were profuse, painful and regular.

She has been married 14 years; four children; no miscarriages; labors easy; micturition normal; bowels extremely constipated.

Present Illness. In the spring of 1891 she had the first attack of the pain from which she now suffers. This attack began as a severe cramp-like pain beneath the right costal margin. She had some fever but no chills, marked nausea and vomiting (the vomitus consisting of "pure gall"). This attack lasted 12 hours, and the administration of morphia was necessary in order to give relief from pain. She noticed during this attack an oblong swelling beneath the right costal margin. This tumor, which was tender and sore, gradually diminished in size and within two weeks entirely disappeared. She was much constipated during the attack and her urine was very dark, but cleared up rapidly after it. Another and similar attack followed within a week after recovery from the first.

About one month after this second attack she had an attack of what was called "bilious fever," but which some of her neighbors thought was "typhoid fever." She had high fever, severe occipital headaches, night sweats and chilly sensations, was extremely nervous and had constipated bowels. She had no pain, no epistaxis; and no rose spots were remembered. The fever lasted about four weeks, when there was a remission of 4 to 5 weeks, followed by another rise of temperature, which lasted about one month.

Following this fever she has had up to the date of admission to the hospital attacks of pain similar in character to the first two every three or four weeks. These have varied somewhat as to the severity of the pain, but have been of the same general character. She has now constant pain and tenderness over the gall bladder. She has never been markedly jaundiced.

Examination of patient. A healthy-looking woman; heart and lungs apparently not diseased; pulse, 90; temperature, 99° F; abdomen symmetrical. Edge of liver just palpable beneath the costal margin. No tumor nor irregularity was felt, but much tenderness was complained of during deep palpation over the situation of the gall bladder. The right kidney was distinctly felt. Liver dullness one finger-breadth beneath costal margin.

Vaginal examination. Negative.

A diagnosis of "gall stones in the gall bladder and probably in the cystic duct" was made by Dr. Ramsay, resident gynecologist, and an operation was advised.

Operation. She was operated upon, March 19, 1898, by Dr. Kelly, who made the following notes:

"Disease. Cholelithiasis, stones in the cystic duct.

Complications. Extensive adhesions of the colon walling off the gall bladder.

Incision in the linea semilunaris, exposing the liver; gall bladder dissected out from adherent colon, exposing a small thick bladder; stones felt low down. Gall bladder incised vertically; walls very thick; one artery cut at upper angle of incision; a small amount of bile and milky fluid escaped; spherical stone 15 cm. in diameter removed with difficulty from the lower part of gall bladder; below this another stone felt through an opening about 8 mm. in diameter, a thick fibrous septum separating the two stones, which was dilated with the finger, and the second stone was removed with scoop. Below or rather above the gall bladder a hard mass about 3 cm. long and 12 mm. broad was felt running up under liver where it could not be reached except with finger."

The gall bladder was closed, a small gauze drain was inserted just beneath it into the abdominal cavity, and the abdominal incision was partially closed.

Following the operation the patient made a good recovery and was discharged from the hospital, March 24, 1898, apparently well. There was some suppuration along the tract of the drain.

At the time of her discharge she had had no attacks of pain since operation. The wound had entirely healed. Staphylococcus pyogenes aureus was grown from the suppurating drain tract.

Bacteriological Examination of the Contents of the Gall Bladder.

Unfortunately cover-glasses of the bile were either not made or were lost after the operation. A smear upon an agar slant showed after 48 hours a growth of the micro-organism, which proved to be the bacillus typhosus. This gave upon agar a white, semi-transparent growth; cover-glasses stained with gentian violet showing a micro-organism 2 to 4 times as long as thick, slightly curved with rounded ends and staining rather faintly.

The micro-organism from an 18-hour agar growth was actively motile. Upon potato after a few days a faint, moist appearance only could be seen. Cover-glasses showed the same bacillus as upon agar, and some much larger forms were also seen. Irregularities of staining were noticeable. Litmus milk was very slightly acidified but not coagulated. No fermentation took place with glucose-agar. Gelatin was not liquefied, but showed on the surface a thin growth with irregular well marked edges. Widal's reaction was marked, as shown by the following notes made by Dr. Norman B. Gwyn, assistant resident physician:

"An agar smear from patient L. P. agglutinated *typically* by serum of a typhoid patient. Serum of patient L. P. agglutinates a known typhoid organism rapidly at 1–100 dilution. Reaction is immediate and positive, more like that of an acute attack than of an attack of several years ago."

Summary.

The patient had two attacks of pain caused by gall stones in the spring of 1891. These were followed within a month by an attack of what was presumably typhoid fever. The gall bladder became infected by the bacillus typhosus, which caused a chronic inflammation, which continued until the time of operation seven years after the typhoid fever. There was no history of an attack of typhoid fever subsequent to the attack in 1891.

THE TRANSPLANTATION OF THE RECTUS MUSCLE IN CERTAIN CASES OF INGUINAL HERNIA IN WHICH THE CONJOINED TENDON IS OBLITERATED.

(A PRELIMINARY REPORT.)

By Jos. C. Bloodgood, M. D., *Associate in Surgery and late Resident Surgeon, The Johns Hopkins Hospital.*

The term "obliterated" is used because the extreme condition is more likely to be an acquired one rather than congenital. Undoubtedly the conjoined tendon may be congenitally very narrow or very attenuated. However, the important point to be recognized at the operation is that the conjoined tendon is either obliterated, very narrow, or very attenuated, and that the lower angle of the inguinal canal (Hesselbach's triangle) has lost its strongest support (the conjoined tendon), and that something (the transplanted rectus muscle) must be substituted for this defect at the operation for hernia.

The following article will also appear in the Surgical Report No. 3 of the Johns Hopkins Hospital, Fasciculus 3–4, Vol. VII, with the report on the operation for hernia.

A Description of what is meant by the Obliteration of the Conjoined Tendon in Cases of Inguinal Hernia.

On making a careful study of inguinal hernia the writer has been impressed with the fact that they may be divided into two groups; the larger group (*A*) includes those cases in which the conjoined tendon is wide and firm, and the second, a much smaller group (*B*), includes those cases in which the conjoined tendon is practically completely obliterated.

Group A. In those cases of inguinal hernia in which the tendon is present it is easily discoverable before and demonstrable during the operation. If one inserts the index finger into the external ring, by invaginating the scrotum, the finger meets, after passing the pillars of the ring, a firm wall of tissue, the conjoined tendon, and it is to the outer side of the outer border of this tendon that the finger feels the impulse of the inguinal hernia. At the operation, if one examines the posterior wall of the inguinal canal, this tendon, if present, will be found to extend from the outer border of the rectus muscle to within about 1 cm. of the deep epigastric vessels. In some cases it may be wider, in other cases narrower. This tendon is clearly shown in Quain's Anatomy, 10th edition, Appendix, Fig. 23, p. 52. In Quain's Anatomy it is described as follows (p. 55): "At the part of the abdominal wall through

which the direct inguinal hernia finds its way there is recognized on its posterior aspect a triangular interval, the sides of which are formed by the epigastric artery and the margin of the rectus muscle, and the base by Poupart's ligament. It is commonly called the triangle of Hesselbach. The triangle measures about two inches (5 cm.) from above down, and an inch and a half (3.5 cm.) transversely at its base. In this area the abdominal wall consists of, besides the integuments, 1. the aponeurosis of the external oblique muscle, which is perforated toward the lower and inner corner of the space by the external abdominal ring; 2. the inner portion of the cremaster muscle covering the spermatic cord at the lower and outer part of the space, and above this, the lower fibres of the internal oblique and transversalis muscles passing to their insertion *by the conjoined tendon, which, as a rule, extends over the inner two-thirds of the lower part of the triangle;* 3. transversalis fascia; 4. subperitoneal tissue, and 5. peritoneum.

The conjoined tendon varies greatly in its development. In many cases it is very slight and scarcely to be distinguished, while in others its deeper portion, derived from the transversalis muscle, covers the whole breadth of the triangle, reaching outwards along the deep femoral arch as far as the internal abdominal ring."

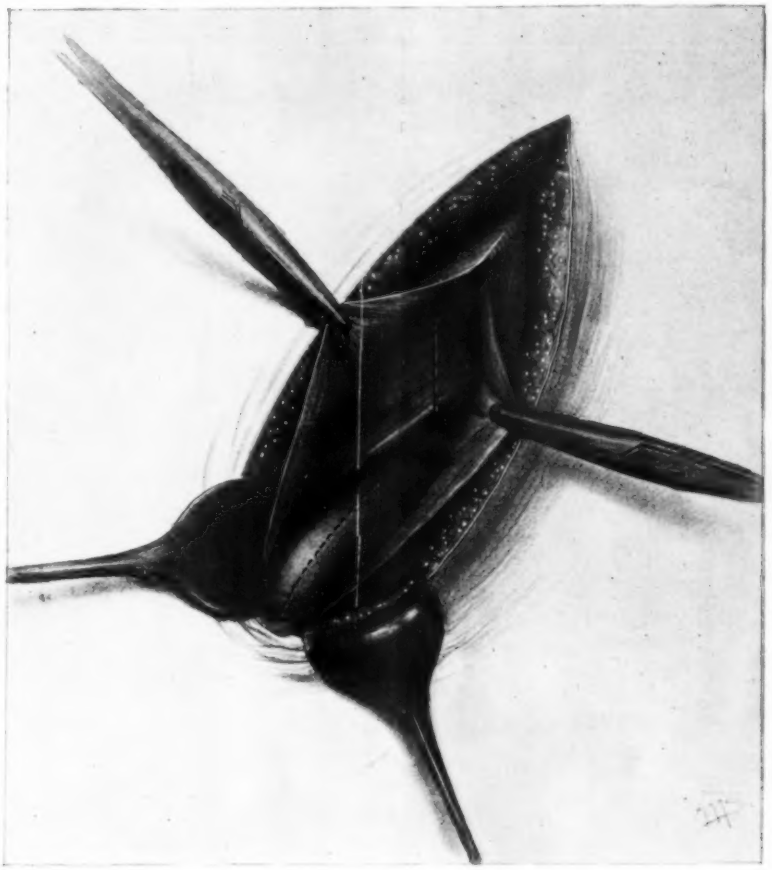

FIG. 1.

The observations by the writer on the variations in the width of the conjoined tendon and its complete obliteration in some cases were made without the knowledge of the statement just quoted in Quain's Anatomy, and he was very glad to find a confirmation of his observations. The writer is not familiar with any other surgeon or anatomist who has dwelt upon the importance of the *obliteration* of the conjoined tendon as the chief cause of recurrence in these cases of hernia.

In cases of hernia in which the conjoined tendon is wide and firm the rupture takes place between the outer border of the tendon and internal oblique muscle. It may be either of the direct or indirect variety. It then extends down along the inguinal canal and protrudes from the external ring. In these cases the problem is a simple one; it is only necessary to suture the tissues down to or just beyond the outer border of the tendon. There is no tendency to recur in the lower angle of the wound just above the pubes and to the outer side of the outer border of the rectus, because at this position the protrusion of the peritoneum is prevented by the conjoined tendon. If one does not transplant the cord a hernia may take place along the cord, protruding between the outer border of the conjoined tendon and sutured tissues. If one transplants the cord (as in Halsted's or Bassini's operation) the probability of a recurrence at this position (the lower angle), at least as far as our cases are concerned, is practically nil.

The probability of a recurrence if the cord is transplanted (as in the Halsted or Bassini operation) is very much less than in the older operations in which the cord was not transplanted. Theoretically (in my opinion) the position of the cord in Halsted's operation is better than the position of the cord in Bassini's operation, as the cord is made to protrude through the thickest part of the abdominal wall (aponeurosis of the external oblique and divided internal oblique muscle); practically the results after Halsted's operation in which the wounds have healed per primam are better than in any list of cases yet published, although only very slightly better than after Bassini's operation (143 cases—3 very small recurrences at the position of the cord).

Group B. In cases in which the conjoined tendon is obliterated, if one inserts the index finger (invaginating the scrotum), after passing through the external ring, the finger does not meet any obstruction, but can be introduced without difficulty into the abdominal cavity for some distance; in this position, to the medial side the finger feels the sheath of the rectus muscle; by curving the finger downwards and backwards the posterior surface of the symphysis pubis can be easily palpated. The opening into the abdominal cavity extends from the outer border of the rectus and from the arch of the pubes, upwards and outwards to the internal oblique muscle. Before operation the number of fingers which can be intro-

duced is limited by the size of the external abdominal ring. In some cases it is but one finger, in others two or more fingers. At the operation, however, after the division of the aponeurosis of the external oblique from the position of the external ring upwards, one can usually introduce the entire hand into the abdominal cavity; in these cases the conjoined tendon is either thin and relaxed or completely obliterated, and the posterior wall of the inguinal canal from the outer border of the rectus upwards and outwards to the internal oblique muscle, and downwards and outwards to Poupart's and Gimbernat's ligament, is formed only by the thin and easily stretched transversalis fascia and areolar tissue.

The following figures, taken from the "Second Report on Hernia" which the writer is about to publish, demonstrate the importance of the obliteration of the conjoined tendon as a factor (perhaps the chief factor) in the recurrence of the hernia. As stated before, the larger group includes those cases of hernia in which the conjoined tendon is wide and firm. In this group (*A*) there have been 211 cases with 7 recurrences. In 6 cases (about 3 per cent.) the recurrence has taken place at the position of the transplanted cord, to the outer border of the conjoined tendon; all of these recurrences occurred within one year, and each one is a very small affair. In one case (½ per cent.) the recurrence took place 5 years after operation, in the lower angle of the wound. After a severe illness associated with a constant cough, in this case the conjoined tendon gave way.

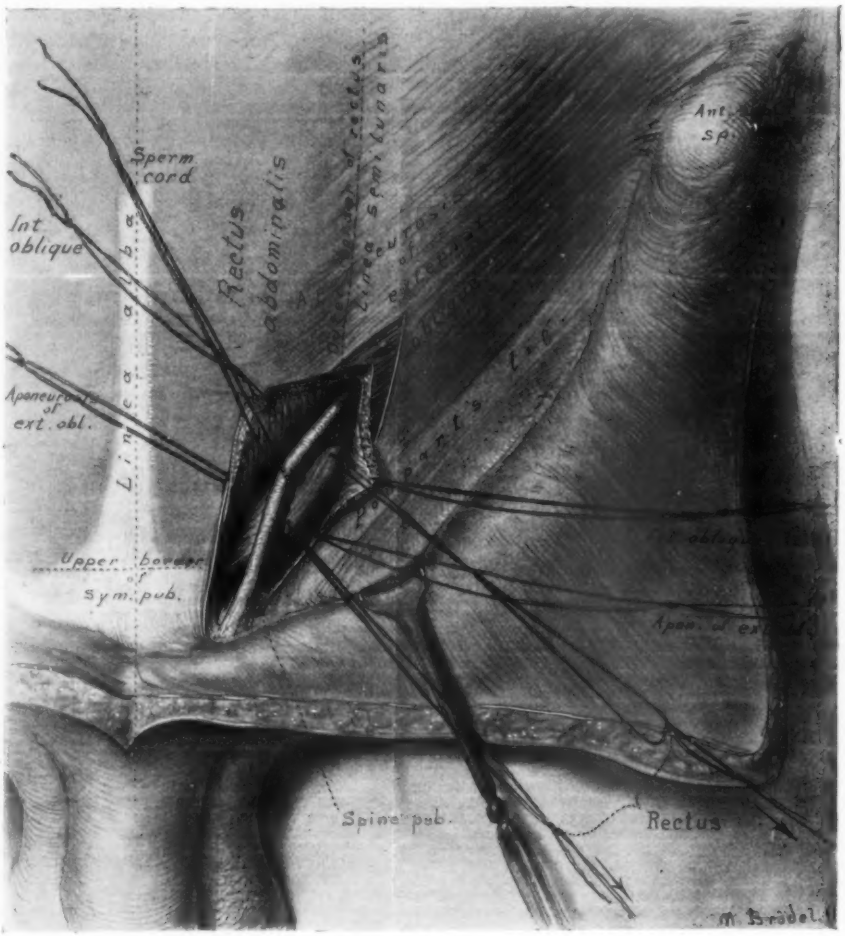

Fig. 2.

In the smaller group (*B*) in which the conjoined tendon was obliterated there are 10 cases, with 5 recurrences (50 per cent.); each recurrence took place in the lower angle of the wound within a few months or a year, and the recurrent hernia is larger in each case than those in group *A*. In two cases the rupture descended into the scrotum.

Suppuration in both groups *A* and *B* has also been associated with the recurrence of the hernia.

In the larger group (*A*) the following figures show the relation of suppuration to recurrence, but also support the conclusion in regard to the conjoined tendon.

Wounds which Healed Per Primam.

(1) Halsted's typical operation, 143 cases, 3 recurrences. Each recurrent hernia small and situated at the position of the transplanted cord.

(2) Cases in which the cord has been excised, 43 cases, 1 recurrence. In this case the recurrence has taken place through a split in the aponeurosis of the external oblique, to the outer side of the conjoined tendon.

Wounds which Suppurated.

(1) Halsted's typical operation, 20 cases, 3 recurrences. In two cases the recurrent hernia is situated at the position of the transplanted cord, in one at the lower angle of the wound, described before.

(2) Cases in which the cord has been excised, 5 cases, no recurrences.

In the 10 cases included in the smaller group (*B*) there have been 3 recurrences among 7 cases in which the wound healed per primam, and 2 recurrences in the 3 cases in which the wound suppurated; in these 2 cases the recurrent hernia descended into the scrotum, and they represent the only complete recurrences in the entire series of 221 cases.

Impressed by the large proportion of recurrences in the *few cases* (3 recurrences in 7 cases) in which the conjoined tendon was obliterated, and with a hope of solving the additional problem presented by the obliteration of this tendon, the writer has devised, and in 8 cases performed a plastic operation on the rectus muscle, bringing this muscle down and suturing it with the other available tissues to Poupart's ligament and to

the aponeurosis of the external oblique from the arch of the pubes up to the position of the transplanted cord. The procedure is a very simple one, and the inclusion of the transplanted rectus in this portion of the wound must add strength. In the past we have learned the proper introduction and utilization of muscular tissue in laparotomy wounds. Every surgeon is familiar with the numerous herniæ after laparotomies in which the incision has been made in the linea alba, in which cases only the fascia was sutured. In 4 of our own operations for umbilical hernia in which only fascia had been sutured there have been 3 recurrences; in those cases in which the rectus muscle had been exposed and sutured there have been no recurrences. After a careful observation of all the laparotomies performed by us in this hospital for a period of over eight years we find that there has been but one hernia in a laparotomy wound, which has healed per primam throughout, and in which muscle as well as fascia has been approximated. So impressed have we been with the importance of including muscle in the suture after laparotomy wounds that it is our rule in medium laparotomy to cut through the inner border of the rectus muscle rather than through the linea alba, and through the outer border of the rectus rather than through the semilunaris; and Prof. Halsted in his original conception of his operation for inguinal hernia divided the internal oblique muscle with this object in view. He states in his original communication, "I make and close the wound in operations for hernia on the same principle as in any other laparotomy wound." The writer therefore claims no originality whatever in the use of the muscle to strengthen the hernial wound, but simply the original idea of transplanting the rectus to strengthen the wound in certain cases of hernia.

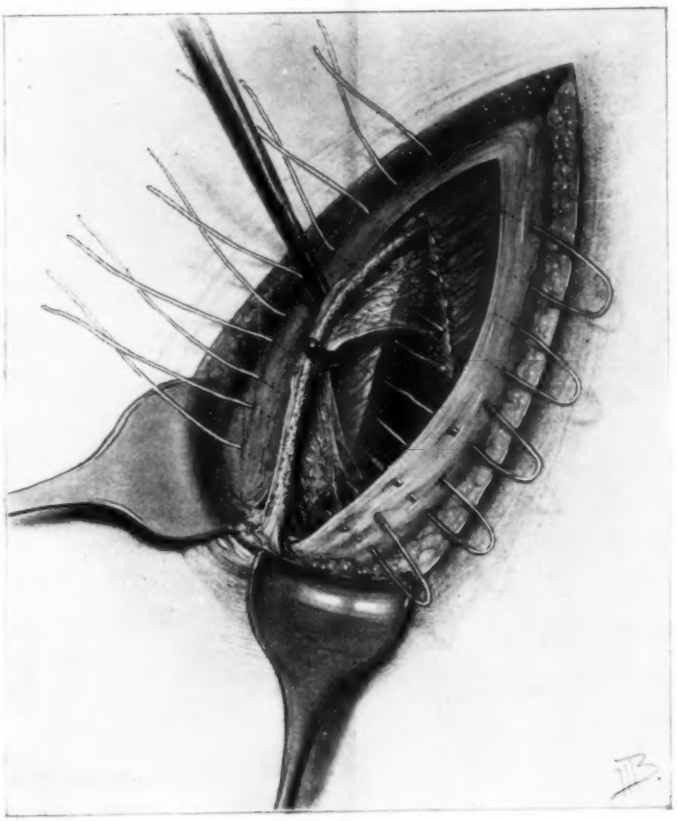

FIG. 3.

The procedure is a very simple one; the method of operation with this exception is the same as that followed in the typical Halsted operation. Before inserting the deep sutures the sheath of the rectus muscle is exposed; this is easily done by retracting upwards and inwards the aponeurosis of the external oblique and internal oblique muscles. The sheath of the rectus is divided in the direction of the muscle bundles from its insertion in the symphysis pubis upwards for a distance of 5 cm. After the division of the sheath the outer border of the belly of the muscle bulges out; it is caught with two or three sutures of heavy black silk which are used as retractors to draw the muscle outwards and downwards. The operation at this stage is shown in Fig. 2. The deep sutures of silver wire are then inserted in exactly the same manner as described in Halsted's operation, with the addition that the four sutures below the transplanted cord include the *sheath* of the rectus and the *muscle* (Fig. 4); when these sutures are tied the rectus muscle is approximated to Poupart's ligament and the aponeurosis of the external oblique, from a position just below the transplanted cord down to the symphysis pubis, in addition to the divided and transplanted internal oblique muscle. Fig. 4 and Fig. 5 clearly demonstrate that the transplanted rectus strengthens the lower portion of the wound, which has been weakened by the obliteration of the conjoined tendon, better than any other available tissue could do.

The writer had this idea in mind for over a year, but not until April, 1897, did a case present itself in which the conjoined tendon was obliterated and in which he considered it necessary to transplant the rectus.

These drawings were made by Mr. Max Brödel from careful dissection on the cadaver and from operations.

EXPLANATION OF THE PLATES.

Fig. 1. Halsted's operation, second stage. The aponeurosis of the external oblique has been divided, exposing the inguinal canal and the internal oblique muscle. The dotted lines on the muscle represent the direction and extent of its division.

Fig. 2. The sac has been excised and the peritoneal cavity closed. The internal oblique muscle has been divided and the rectus exposed and transplanted; at this stage the wound is ready for the insertion of the deep sutures.

Fig. 3. Halsted's operation, deep sutures inserted. This drawing demonstrates that there has been no attempt to completely close the external ring, and even if this should be done, there is no available muscle to approximate, unless the rectus is transplanted. If the conjoined tendon is wide and firm it is not necessary to completely close the external ring. Recurrence is prevented in the lower angle (Hesselbach's triangle) by this tendon.

Fig. 4. The transplanted rectus muscle included by the

deep sutures. In this drawing the cord has been excised in order to represent the operation more clearly. This drawing clearly demonstrates that the rectus muscle fills the lower angle of the wound, the part included by the lower two sutures. It also shows that the rectus strengthens the entire wound up to the position of the transplanted cord.

Fig. 5. Diagram of the position of the transplanted rectus muscle demonstrates the slight change in the direction of its fibres.

Note.—April, 1898. During the last few months Prof. Halsted in one case and Dr. Cushing in three cases have transplanted the rectus muscle.

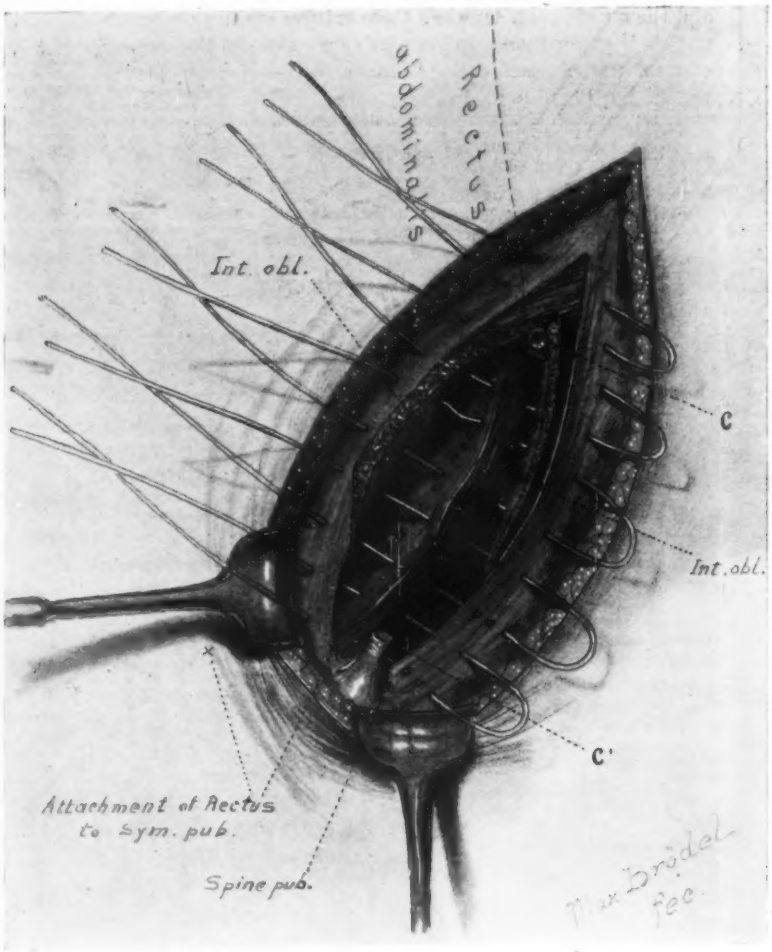

Fig. 4.

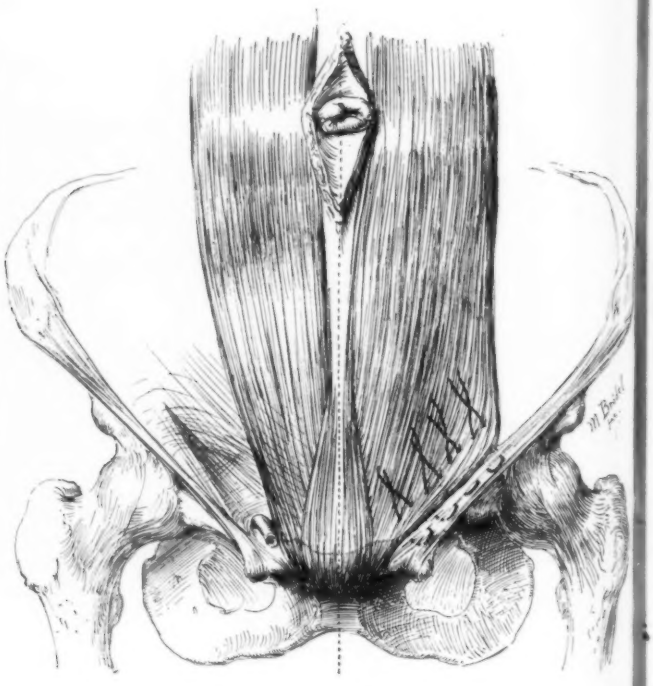

Fig. 5.

Diagram of the position of the transplanted rectus muscle, demonstrating the slight change in the direction of its fibres.

HYDRAULIC PRESSURE IN GENITO-URINARY PRACTICE, ESPECIALLY IN CONTRACTURE OF THE BLADDER.

By Hugh H. Young, M. D., *Instructor in Genito-Urinary Surgery, Johns Hopkins University.*

Since the opening of the Johns Hopkins Hospital in 1889 it has been the custom to treat cystitis by intravesical irrigations of various solutions. The irrigations have been performed without the use of a catheter, hydraulic pressure alone being used to force the irrigating fluid back into the bladder, which when full is emptied by the simple act of micturition.

This method was a direct sequence to Dr. Halsted's method of treating gonorrhœa by copious irrigations of antiseptic solutions which he promulgated in New York in 1883. While irrigating the urethra he found that some of the fluid would be forced back into the bladder if the irrigating bag were held sufficiently high.

The acorn nozzle (Fig. 1) which he had devised for urethral irrigation was used, but held crowded into the meatus until the fluid was forced into the bladder by hydraulic pressure.

According to this method many cases of cystitis have been treated at the Johns Hopkins Hospital with remarkably satisfactory results.

While treating a number of these cases I found Dr. Halsted's acorn urethral nozzle unsatisfactory for intravesical irrigations, because it is so blunt that it cannot be wedged into the meatus tight enough to prevent the escape of fluid around it. To obviate this I had a nozzle* made with conical point of much more gradual slope, which can be tightly wedged into the meatus without hurting the patient. This has proved very satisfactory (Fig. 2). By the use of this nozzle we have never found a case in which the bladder could not be irrigated without a catheter.

I have lately found that somewhat similar nozzles have been devised by Janet and Valentine.

FIG. 1.—Halsted's Acorn Urethral Nozzl

FIG. 2.—Nozzle for Intravesical Irrigations.

Case I. During the summer of 1896 a patient was admitted to the hospital suffering with chronic pyonephrosis and cystitis. He was very weak and emaciated, and his urine, which was loaded with pus and mucus, was voided every half-hour in small amounts. An examination of his bladder showed that it was greatly contracted, holding only 40 cc. (about an ounce). The mucous membrane was rough, corrugated, very tender and bled easily.

After bladder irrigations were begun it occurred to me that benefit might be obtained by dilating his bladder by hydraulic pressure, thus lessening the disagreeable frequency of urination.

At first only 40 cc. could be forced into the bladder, but its capacity soon began to increase, and at the end of ten days his bladder held 150 cc. (5 oz.), and urination was not nearly so frequent. His cystitis was also improved.

*Made by Whitall, Tatum & Co., Phila.

Unfortunately I was prevented from continuing the treatment longer, and though the results were very promising the outcome was still uncertain. The next case, however, surpassed my most sanguine expectations. I will report it at length.

Case II.—*Severe chronic cystitis, 30 years' duration. Contracture of bladder, constant dribbling urine for three years. Capacity of bladder 30 cc. Dilatation to 290 cc. by hydraulic pressure. Return of continence of urine.*

I. H., æt. 65. American. Occupation, huckster. Admitted Dec. 17, 1896, on account of continual dribbling of urine.

Family History. Negative.

Previous History. He denies syphilis and gonorrhœa.

Present Trouble. Thirty years ago he injured his perineum in a fall, following which he says he had extravasation of urine, required frequent catheterization and was very sick for several months. At the end of seven months perineal section was performed in New York (probably for stricture of urethra following traumatism). After that he passed sounds on himself about twice weekly for twenty years. Cystitis, which was continuously present, became greatly aggravated six years ago, frequency of micturition increased greatly, and for the past three years there has been a constant dribbling of urine.

Status Præsens. The urine dribbles continually, patient wearing cloths between thighs to absorb it. The odor is very offensive even ten feet away. Patient suffers severe pain in bladder and urethra and is perfectly miserable. He is unable to work and is shunned by his friends.

Examination. He is a thin, emaciated old man, with clothing wet from urine with a very foul ammoniacal odor, which appears to dribble continually.

A searcher passes into bladder readily, but reveals several irregularities in the urethra.

Bladder very small, not admitting the rotation of searcher. When fully distended with fluid it holds only 30 cc. (℥ i), any further distension causing pain. Prostate not enlarged. No stone or intravesical growth made out. Mucous membrane of bladder rough. Searcher caused no hemorrhage. Kidneys not palpable.

Analysis of Urine. Heavy gray sediment amounting to one-third of specimen. Reaction intensely alkaline. Much stringy mucus. Albumen in large amount. No sugar. Microscopically mucus and pus cells, triple phosphates. One week after admission daily forced dilatation of bladder begun, using a solution of bichloride of mercury, 1 to 150,000.

The tabulation on page 102 shows the improvement made.

Remarks.—In this case cystitis had been present for 30 years. Continued inflammation had probably destroyed the mucous membrane, caused the muscle to be replaced by fibrous tissue, through the cicatricial contraction of which the capacity of the bladder was steadily reduced until it finally held hardly one ounce and had entirely lost its power of expelling urine. As a result the urine had dribbled constantly for three years before he entered the hospital.

Under forced dilatation the capacity of bladder rapidly increased from 30 to 290 cc. (℥i to ℥x), but the contractile power did not fully return, probably owing to the fibrous replacement of the bladder muscle. There was a constant residual of 60 to 100 cc. and as a result micturition was frequent.

Whether the tonicity would have returned in time we are unable to say, as we have never seen the patient since. Improvement, however, was very great.

Date.	Day of Treatment.	Capacity of Bladder. Largest amount held on forced distension.	Interval. Longest time between two urinations.		Remarks.—Case II.
		Cu. Cm.	Hr.	Min.	
Dec. 17		30		Dribbling	Severe chronic cystitis 30 years. Urine ammoniacal, loaded with mucus. Clothes saturated with urine.
" 26					Dilatation begun. Irrigation of bichloride followed by boric twice daily.
" 27	1	40		"	
" 30	4	90		"	Urine clearer, reaction less alkaline.
Jan. 6.....	11	200		"	Reaction acid. Great improvement in general health.
" 11.....	16	240		30	Has ceased to dribble, but bladder is unable to expel all of urine, 60 cc. residual, seems to have very little contractile power.
" 16.....	21	245	1		At times voids 160 cc. naturally. Urine acid, pus slight.
" 23.....	28	255	1	30	
" 24.....					He feels very badly. Some pyrexia. Refuses dilatation treatment.
Feb. 20		215			Treatment resumed. Urine has become alkaline again and is voided at frequent intervals. Great increase in pus.
" 27	7	290			
March 6		280	3		Bladder seems to have no muscular power. After catheterization he is able to retain urine for 3 or 4 hours, but then he only voids a small amount, and after that voids every half-hour or so, leaving a residual of about 100. Patient is devoid of will and energy, does not try to do better. Is greatly improved in general health. Dribbling has ceased and cystitis much improved. Discharged.

Case III.—*Chronic cystitis 10 years. Contracture of bladder, holding only 40 cc. Micturition every 30 minutes. Under forced dilatation capacity increased to 160 cc., and interval to 4 hours.*

Surg. No. 6573. J. T. Age 41. American. Farmer. Admitted May 26, '97.

Complaint. Frequent and painful micturition.

Family History. Negative.

Past History. Denies gonorrhœa and syphilis.

Present Trouble. Ten years ago began to have frequent and painful micturition. No cause assigned for attack. Denies ever having gonorrhœa. Had no instruments passed into urethra. Had been in good health previously.

Urination continuing frequent and painful, with occasional tinges of blood, patient consulted a physician at the end of a month, who passed an instrument to detect a calculus, but none was found.

Following examination he had chills and fever, lasting two or three days, accompanied by marked aggravation of bladder trouble.

At the end of two years patient suffered severe pain in bladder, and his urine contained a great deal of blood, and dribbles continually.

To relieve distress of patient a perineal section was done in Philadelphia. This operation was followed by marked improvement of symptoms. Perineal fistula continued for two years, and patient suffered very little till ten months ago when he again began to pass blood. Urination soon became very frequent and painful, and since then his bladder symptoms have steadily grown worse.

Status Præsens. Patient now voids urine every fifteen minutes, though at times half an hour may intervene. He suffers a constant pain located in lower abdomen, worse at end of urination, and then extending into penis. Urine often contains blood, free and clotted, and most at end of micturition. Stream frequently stops suddenly, accompanied by pain running to end of penis. Has never passed gravel.

In anterior part of anus is a fissure which he has had for several years.

Analysis of Urine. June 5th. Smoky, blood-stained deposit of mucus. Alkaline in reaction. Microscopically pus cells, red blood corpuscles and squamous epithelium.

On June 3rd treatment was begun. Bladder distended four times daily with Thompson's fluid.

In six days its capacity was doubled (60 cc.), and in two weeks trebled. Accompanying this, the interval between urinations increased from fifty minutes to one hour and thirty-five minutes. A great change had taken place in his general condition; the con-

Date.	Day of Treatment.	Bladder Capacity. Largest amount held on forced distension.	Urine. Largest amount voided at one time.	Interval. Longest time between two urinations.		Remarks.—Case III.
		Cu. Cm.	Cu. Cm.	Hr.	Min.	
June 3.....	1	40	30		30	Constant severe pain in bladder, causing him to stoop. Urine loaded with pus, mucus and blood. Reaction alkaline.
" 8.....	5	60	40	1	15	
" 11.....	8	85	70	1	40	General health improved. Pain now absent. Can now walk erect. Urine much clearer.
" 18.....	15	105	80	2	.....	Has gained 8½ pounds in weight.
" 28.....	25	130	110	2	30	Patient discharged; to continue treatment at home. Patient lost ground for a time, but soon improved rapidly.
July 14		100	80	2		
" 23		135	100	3		
" 29		160	130	4		He writes that he feels like a new man, passes no blood or mucus, is free from pain and has no trouble conducting treatment at home.
Sept. 23....						Irrigations have been discontinued, contrary to orders, for more than a month. He writes that he still holds his urine three or four hours at a time; has no pain and is very well.

stant pain in bladder, intensified by urination, which was present on entrance, had practically disappeared, the urine had become acid, and the amount of pus diminished markedly. He had gained 8½ lbs. in weight.

At the end of three weeks his bladder held 130 cc., he voided naturally 110 cc., and the interval between acts of micturition was two hours and thirty minutes.

The tabulation on the previous page shows graphically the improvement. (See also chart of cases appended).

Remarks.—In this case the bladder was exquisitely tender and would stand very little dilatation, the increase in capacity was therefore slower. I have not heard from him for a month, but I believe the capacity will be fully restored.

Case IV.—*Chronic cystitis* 5 *years. Contracture of bladder, capacity* 60 *cc. Micturition every* 45 *minutes. Pott's disease. Intestinal tuberculosis. Under forced dilatation size of bladder increased to* 195 *cc. and interval to* 3 *hours* 30 *minutes. Marked amelioration of cystitis.*

Surg. No. 6580. G. L., single. Age 28. American. Laborer. Admitted May 30th, '97.

Complaint. Frequent and painful micturition.

Family History. Measles, pneumonia (?). Denies lues and gonorrhœa. Pott's disease 16 years ago, following injury, has never given rise to abscess, gives no pain now, seems to have undergone resolution.

Present Illness. Indefinite history of cystitis for five years or more. Denies gonorrhœa, but acknowledges having had sounds passed two years previously. Cystitis characterized by burning pain running down to end of penis, intermittent appearance of blood in urine, free and clotted, increased frequency of micturition, now every thirty to forty minutes. During past year has passed sounds on himself every week, no antiseptic precautions.

Patient has suffered from intermittent attacks of severe abdominal pain, every week or so, for a long time, associated with a continued diarrhœa, mucus and occasional streaks of blood.

Examination. Well nourished man, with a marked stoop from kyphosis in middle dorsal region.

Chest and abdomen negative. Cystic swelling attached to each epididymis.

Rectal Examination. Prostate enlarged, irregular, with slight nodular roughnesses. Very tender on pressure.

Bladder. Instrument introduced easily. No urethral stricture. Introduction causes considerable pain in region of prostate. Bladder contracted. On forced distension holds only 60 cc. (℥ ij). No stone present. No intravesical growth made out. With finger in rectum and instrument in bladder, prostate feels nodular and extremely tender.

Instrument causes slight hemorrhage.

Tuberculin injected, small but definite reaction following. It is probable that tuberculosis of intestine and prostate is present, along with latent vertebral tuberculosis.

Urinary Analysis, March 30th. Smoky, shreds of mucus, small blood clot, heavy white precipitate. Acid, sp. gr. 1020. Albumen, trace. No sugar. Microscopically red blood corpuscles, leucocytes and epithelial cells in abundance. No casts.

There was manifestly little hope of curing his bladder trouble, but the relief afforded by forced dilatation for only three weeks was wonderful, as shown in diagram.

Date.	Day of Treatment.	Bladder Capacity. Largest amount held on forced distension.	Urine. Largest amount voided at one time.	Interval. Longest time between two urinations.		Remarks.—Case IV.
		Cu. Cm.	Cu. Cm.	Hr.	Min.	
May 30			60		45	Admitted. Suffers with severe pain in bladder. Urine acid, with pus and blood.
June 5.....	1	80	60	1	10	Systematic dilatation begun.
" 8.....	3	110				
" 10.....	5	130	90	2	5	Almost free from pain. Feels greatly improved.
" 18.....	13	160	120	2	35	
" 23.....	18	180	160	2	55	
" 27.....	22	195	180	3	30	During the latter part of three weeks continued diarrhœa, with pain in anus and prostate. Urine free from blood; much less pus. Cystitis considerably improved.

Case V.—*Severe chronic cystitis for* 14 *years. Gradually contracting bladder, holding* 20 *cc.* (℥ v) *on entrance. Micturition every* 15 *minutes. Urine alkaline, with much mucus and pus. Under hydraulic pressure bladder dilated to* 370 *cc.* (℥ xii), *and interval between acts of urination increased to* 4–5 *hours.*

Mr. G. B. Age 40. Canadian. Drummer. Admitted May 4, '97.

Complaint. Frequency of micturition, every ten or fifteen minutes, with pain, blood and mucus.

Family History. Negative.

Past History. Usual diseases of childhood.

First and only attack of gonorrhœa fourteen years ago. Double epididymitis and posterior urethritis. Discharge lasted several months. Four months later began to have a sense of fullness in bladder, pain on micturition in end of penis, increased frequency, etc.

Vesical disturbance has continued since that time, with only temporary remissions.

Cystitis soon became very severe, urine foul, much blood and mucus. Pain in bladder often very severe. Has been treated by numerous physicians and hospitals, with internal remedies and local irrigations through catheter, with only temporary relief.

Following indiscretion in drinking, etc., every few months patient has had acute exacerbations of disease, accompanied by chills, high fever, vomiting, pain and frequent micturition.

The interval between acts of urination has steadily become shorter, and for the past two years patient has voided urine every ten or fifteen minutes. In order to attend to business he has found it necessary to wear a rubber urinal, which has produced a severe balanitis.

Status Præsens. Increased frequency of micturition, every 10–15 minutes night and day.

Pain. Site in perineum, continual, scalding or burning.

Urine. Always slightly blood-stained, ammoniacal odor, considerable mucus.

Capacity of bladder, rarely passes over ℥ ss.

General health fair, but rendered unhappy and miserable by bladder trouble. Unable to attend to business.

Physical Examination. A fairly well nourished man. Facies worried. Chest and abdomen negative. Kidneys not palpable. Right testicle atrophied, an irregular nodule in epididymis.

Rectal Examination. No enlargement of prostate. Vesiculæ seminales palpable. No abnormality. No bas fond. No stone

palpable bimanually, tenderness marked in region of neck of bladder. Cicatrix in perineum from old perineal section.

Bladder. Urine chart shows that about 20 cc. (ʒ v) is largest amount passed, with an interval of 15 minutes between acts of urination. When bladder is filled with fluid by hydraulic pressure without catheter, 22 cc. is the largest amount which bladder can hold without severe pain.

Urinalysis. Light yellow, cloudy, large clot of mucus. Strongly alkaline. Microscopically pus cells in great numbers, triple phosphates, numerous red blood corpuscles.

Treatment, May 6th. Systematic dilatation of bladder by hydraulic pressure begun; with nozzle held tight in meatus, an elevation of four feet easily forces irrigating fluid into bladder.

Patient instructed to allow fluid to distend bladder as much as can be borne without great pain, then to withdraw nozzle and force the fluid out by urination. This is repeated until 1000 cc. is used. This is to be done every four hours by patient, with assistance of orderly. Thompson's fluid used for irrigation.

The chart shows the progress of dilatation.

April 23, 1898. Patient returns for examination. He has irrigated bladder with moderate regularity once or twice daily up to present time. Solution of boracic acid used. No attempt to dilate bladder. He says he has been in fine health, and but for the presence of pus in urine would feel perfectly well. He urinates every four to six hours; control of bladder, good. Last night did not void for six hours.

Examination. General health good. 200 cc. of urine voided at one time. Urine alkaline, cloudy with pus. Many cocci and bacilli like proteus present.

On forcible distension bladder holds 325 cc. Slight recontraction of urethral stricture at site of previous operation.

Patient voids urine with ease.

It is now one year since the dilatation treatment was begun, and there is no tendency to a recurrence of contracture.

Remarks.—The improvement in this case was remarkable and is graphically shown on the chart which accompanies.

Date.	Day of Treatment.	Capacity of Bladder. Largest amount held on forced dilatation.	Urine. Largest amount voided at one time.	Interval. Average time between two urinations.		Remarks.—Case V.
		Cu. cm.	Cu. Cm.	Hr.	Min.	
May 3.....		22	20		15	Severe pain in bladder and penis. Urine filled with blood, mucus and pus and strongly ammoniacal. Wears a rubber urinal. Has voided urine every fifteen minutes for two years.
" 6.....	1	22	20			Dilatation begun—every four hours. Thompson's fluid.
" 15.....	9	94	40		25	Injected with tuberculin. No reaction.
" 21.....	15	115	70		45	Improvement has been rapid. Pain has entirely gone. Appetite is ravenous. One irrigation of silver nitrate given daily (1 to 400). Urine greatly improved.
" 29.....	24	130	105	1	10	
June 10.....	36	170	120	2	10	*Urine acid.* Very little sediment. No blood.
" 20.....	46	190	155	3		Urine acid.
" 29.....	55	250	190	4	25	Feels like a new man. Can now walk about town four hours without desiring to urinate; is entirely free from pain. Urine is almost clear, acid in reaction. Discharged to continue dilation at home.
July 15.....		225	150	3	35	Home treatment. Lost some ground while traveling.
" 21.....		275	190	3	30	Conducts his own treatment, using one nitrate of silver irrigation and three Thompson fluid irrigations daily.
" 29.....		340	260	5	30	
Aug. 9.....		370	260	6		He is now practically well.
Sept. 30.....		365	280	4	30	Still some pus in urine, but patient feels perfectly well.

Case VI.—*Chronic cystitis 7 months. Contracture of bladder moderate. Capacity of bladder 140 cc. Micturition every hour. Bladder dilated in one month from 140 to 500, with interval of 4 hours 50 minutes. Great general improvement.*

G. C., white, æt. 32. Engineer.

Complaint. Frequent and painful micturition.

History. Gonorrhœa 10 months ago. Three months later beginning cystitis. Frequent hæmaturia. Increasing frequency of micturition. Has lost fifteen pounds in six months. He now voids twenty times in twenty-four hours, burning pain at end of urination.

Urine. Pale, heavy gray sediment, slightly acid, 1012. Albumen in large amount. No sugar. Microscopically pus cells, mucus clot at bottom. Urination every hour, on the average, largest amount passed is 100 cc., generally less. Examination with searcher, no stone, bladder wall rough, corrugated, prostate not enlarged, not tender. No residual urine. Bladder distended until quite painful, holds 140 cc. Forced irrigations of Thompson's fluid begun, to be taken four times daily by patient.

Table on page 105 shows progress of case. Also chart.

General Remarks.

Is there a ureteral reflux? When this method was first adopted the question arose whether some of the irrigating fluid might not be forced up the ureter, when the bladder became forcibly distended. If such were the case pus and dangerous micro-organisms would be carried along, and ascending inflammation and pyonephrosis would certainly result.

The valve-like arrangement of the orifice of the ureter produced by its oblique course for 1¼ inches in the bladder wall would seem to be a special provision of nature to prevent the backward flow of fluids from the bladder into the ureters.

In order to determine whether fluid, under considerable hydraulic pressure, would be forced into the ureters I experimented on a cadaver. After the intestines were removed the ureters were dissected out and cut across within a few inches of the bladder. A very strong solution of methylene blue was prepared and forced into the bladder through the urethra from an elevation of fourteen feet.

The bladder rapidly distended, but no fluid ran out of the cut ureters, although the distension was kept up until 1700 cc. (nearly two quarts) were forced in, and the walls became so thin that the blue solution shone through, and the threaten-

ing aspect of the huge bladder caused most of the bystanders to leave the room.

When the bladder was incised the mucous membrane was found deeply stained blue, but the stain did not extend $\frac{1}{32}$ of an inch into the ureteral orifices.

In another cadaver, with large sacculated bladder and double hydro-ureters, I found it impossible to force fluid from bladder into ureters.

To further test the matter I made the following observation upon a dog, April 4th:

A small male dog received 1 gr. morphia hypodermically. Very deep colored solution of gentian violet prepared. By hydraulic pressure of 11 feet (above dog) the fluid was forced into the bladder without a catheter until the greatly distended bladder could be seen through abdomen.

Abdomen then cleaned, dog etherized, laparotomy performed. Bladder greatly dilated, and dark purple in color from fluid within, intestines pushed aside, ureter located. It contained perfectly clear urine and not a particle of the violet stain. Kidney exposed, no stain present. Although ureter was watched for some time, no vermicular movement was noticed until fluid was evacuated from bladder, when it was distinctly to be seen. Bladder had remained distended for fully 10 minutes. On another dog under ether we exposed the ureter after laparotomy, and watched it carefully while various amounts of fluid were forced into bladder. There was never any passing of the fluid into the ureter. No reverse peristalsis was made out.

These observations seem to show conclusively that fluid cannot be forced up the ureters from the bladder in the dog

Date.	Day of Treatment.	Capacity of Bladder. Largest amount held on forced dilatation.	Urine. Largest amount voided at one time.	Interval. Average time between two urinations.		Remarks.—Case VI.
		Cu. Cm.	Cu. Cm.	Hr.	Min.	
Sept. 4.....			100	1		Burning pain in bladder. Urine faintly acid, very cloudy, heavy sediment of pus and mucus.
" 6.....	1	140	100	1	5	Forced dilatation begun. Thompson's fluid four times daily.
" 11.....	5	230	160	1	30	Much relieved.
" 15.....	9	280	200	2		
" 21.....	15	340	260	3		Free from pain.
" 25.....	19	390	320	3		Urine acid. Pus less, but still considerable.
" 28.....	22	400	380	3	30	
Oct. 3.....	27	500	440	4	50	
" 4.....	28	500	460	4	50	Patient discharged. Is free from any bladder symptoms. Holds urine often for 6 hours during night. Has gained 10 lbs. in weight. Feels like a new man. Urine acid, almost clear, very little pus.

In this case forced dilatation had been used daily in dispensary for a week or so before entrance, and I wish to thank Dr. Gaither for the interest he has shown in the method. Partial dilatation had been accomplished. Cystitis was of 7 months' duration, so there was probably less fibrous tissue present, and dilatation was therefore more rapid than in other cases. Improvement, however, was rapid and marked; relief afforded great; result, cystitis practically cured.

January 10. Capacity 500 cc., interval 5 hours. Feels perfectly well. Does not urinate at all at night. Can hold urine for 10 hours if necessary. Left hospital November 15th. Took irrigations 4 a day up to December 1st. During December twice daily. Since December 28th once daily. Thompson's fluid.

and in man, and they have been borne out by clinical evidence, for in none of the cases has there been any evidence of ascending infection, although the bladders contained many virulent organisms, some streptococci.*

* While this article was in the hands of the printer our attention was called to the work of Lewin and Goldschmidt in regard to reflux from the bladder into the ureter, and their findings are of such importance that I will add them here.

These authors (Virch. Arch. vol. 134, 1893, p. 33), after anæsthetizing rabbits, performed laparotomy and injected fluid into the bladder under pressure. The ureters were then exposed and cut to see if the fluid had entered them. In nearly all cases they found that a small amount of fluid slowly injected would enter the ureter of the rabbit.

Their conclusions are as follows:

"The backward movement of the contents of the bladder into the ureter and pelvis can be produced as well by injection as by artificial retention.

"This result always took place in bladders which were still capable of contraction and *not strongly distended*. The result consisted essentially in an over-distension of the ureters, or, on the other hand, an excitation to increased activity expressed in peristaltic or anti-peristaltic waves.

"*When the bladder is over-distended it is impossible to open the ureteral mouths with the injected fluid.*"

Courtade and Guyon repeated these experiments on rabbits and also on dogs. Their work is discussed at length by Guyon in his *Leçons cliniques sur les maladies des voies urinaires*. In rabbits the reflux into the ureters occurred in 20 out of 32 times, but in dogs only 5 out of 25 times—or strictly 5 out of 38 trials. Guyon says in substance: "In the rabbit as in the dog, entrance into the ureters is only forced when the walls of the bladder are put in a state of resistance from the beginning of the injection. In both animals, every time that the bladder remained flaccid and was passively distended the ureter was not invaded, no matter how much fluid nor how much pressure was used.

"It is established that early tension of the bladder-wall produced by injection of a small quantity of liquid is the condition when the reflux can be observed. No other condition can accomplish it.

"In the five positive experiments the reflux showed itself after the first injection, but never after the second. *Once put on its guard, the vesical muscle does not allow itself to be surprised again.*

Hydraulic Urethral Dilatation.—I have had an opportunity to observe the effect of hydraulic pressure on a urethral stricture in two cases. I may say that it is very easy to force fluid into the bladder through strictures of very small calibre.

In one case—a man convalescing from an operation for cranial abscess—the stricture of fifteen years' duration would not admit the passage of the finest bougie. Urination was extremely difficult, so much so that patient was obliged to squat on the floor and to strain so severely that a hemorrhoidal mass as large as the fist would be forced out.

His bladder was easily irrigated with an elevation of about ten feet, and after this had been done several times daily for two weeks he could void his urine while lying on his back in bed without an extrusion of the piles. The stream of urine became considerably larger.

Another case of moderately tight stricture showed decided evidence of dilatation after a week's treatment. I do not mean to advise this in preference to urethrotomy, but in cases of stricture complicated by severe cystitis, where operation is often followed by absorption of septic materials, chill, fever, and occasionally fatal pyæmia, preparatory lavage of the bladder in this manner is certainly indicated.

When a patient is discharged after dilatation of a stricture the daily use of this method would probably tend to prevent the recurrence of a stricture, and be of benefit to any bladder infection which might coexist.

After perineal section, where it is desirable, on account of cystitis, to continue bladder irrigations, I have found it very easy to force the fluid into the bladder by simply closing the perineal wound with the fingers, or if the opening is small, by the pressure of a sponge covered with rubber protective.

In cases of enlarged prostate, fluid may be easily forced into the bladder without a catheter, but the same trouble is encountered in evacuating it as with the urine. After suprapubic operation, however, it is a very valuable procedure and the most thorough method of cleaning the bladder and combating infection. By closing the suprapubic sinus with a plug or the finger the bladder may be dilated, thus curing or averting one of the most undesirable effects of suprapubic drainage, viz. contracture of the bladder.

Vesical Calculus. In several cases of stone in which the bladder was small we have employed forced dilatation with very gratifying results. In a case now in the wards, who on admission had a severe acid cystitis with a staphylococcus pyogenes albus infection and a bladder which when fully distended held only about 140 cc., we were able in a week to increase the capacity to 400 cc. This was followed by a marked improvement in the cystitis and greatly decreased frequency of micturition. The bladder was then easily reached by suprapubic operation, and the bladder infection so much bettered that it was thought advisable to suture the bladder after removal of the calculus. We consider such preliminary treatment very valuable where infection or contracture is present.

Atony of the Bladder. The possibility of benefiting an atonic bladder by alternate distension and evacuation, a form of massage, so to speak, for the weakened muscle, is shown in the following case (VII).

An old man, paralytic, constantly requiring catheterization from paralysis of bladder, after a time began to regain use of

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When the contractions of the bladder are *total and active*, rather than favoring the entrance of the vesical contents into the ureter, it opposes it.

"The mechanism depends on the fact that there is a band of muscle-fibres surrounding the ureter and wall of the bladder which act as a sphincter, and if these are cut without disturbing the relations of the ureteral mouth at all, the reflux can then occur as regularly in the dog as in the rabbit.

"*However, we can scarcely fear the reflux in man, provided the intraparietal part of the ureter has not been changed anatomically.*" But then, in the face of that statement, on the same page Guyon says:

"This possibility of reflux is a new objection to the employment of irrigations in cystitis, and is also an indication not to allow painful bladders to strive against their contents.

"With a pathologically accentuated sensibility the bladder is put in tension by very small quantities of liquid.

"The abstention from lavage, the retained catheter, and perineal and suprapubic drainage receive new justification, and physiology again asserts the preponderating rôle of the tension of the bladder."

Guyon says the reflux is brought about by a sudden early passive contraction of the bladder, occurring when very little fluid has entered the bladder; and again, if the contraction brought about by the injection of the fluid is active and total, *i. e.* involves the whole bladder, the reflux cannot occur.

The only conclusion therefore is that this precocious contraction must be a partial one in which the muscular fibres which surround the ureters in the bladder-wall have not taken part. The *ureters are probably asleep with their mouths open*, according to Guyon, and "once awakened the bladder cannot be again surprised."

When we consider that Guyon only succeeded in obtaining the reflux 5 times in 38 cases, and that then it was often only on one side; that the narcosis might have been responsible for the "drowsy condition" of the bladder-muscle and ureteral sphincters; that it occurred every time in the thin bladders of rabbits, only 5 times in 38 in the thicker bladders of dogs, and that the human bladder is considerably thicker than that of dogs; that in the numerous cases of cystitis which have been treated by irrigations we have never seen any symptoms of renal pain or infection, we are led to believe that the aforesaid experiments are inconclusive, and that the ureteral reflux does not occur in man, or even in dogs, except under peculiar and exceptional circumstances. We even wonder how Guyon and Courtade could distinguish a "passive" partial contraction of the bladder which did not involve the ureteral sphincters from an "active total contraction." The operation of dividing the sphincter of the ureter, situated as it is behind the bladder, without weakening the bladder-muscle or injuring the mucous membrane of the ureter, is probably the most delicate operation ever performed.

We can justify our practice of forced dilatation by the assertion of Lewin and Goldschmidt that when the bladder of the rabbit, even, is over-distended, it is impossible for fluids to get into the ureters. According to all these investigators, then, a small amount of fluid injected slowly may bring about ureteral reflux with fatal kidney infection, while a large amount rapidly forced in cannot enter the ureter. Accepting these assumptions, then our method of flushing bladders with copious irrigations is much less dangerous than Guyon's favorite instillations of small amounts.

When we consider, then, the great uncertainty of the existence of a ureteral reflux in man, and the very satisfactory results we have had with forced dilatation in cases of contracture of the bladder, we are constrained to think that their use is not contraindicated.

limbs, but the power of expelling urine did not return, probably from atrophy and lessened tonicity of the bladder muscle.

Systematic forcible distension of bladder with fluid was begun and given twice daily. At first it seemed that the catheter would be required to withdraw fluid, but its use was deferred, and after a few minutes, to our satisfaction, the fluid was expelled. After a few weeks of treatment the tonicity of the bladder was practically restored and the patient required no further catheterization. The following case also shows the marked benefit obtained.

Case VIII.—*Syphilis of cord, paraplegia, paralysis of bladder, catheterization, cystitis. Cure of paraplegia under iodides, but contracture of bladder with incontinence persisting. Capacity of bladder 65 cc. Urination every 20 minutes. Under forced dilatation capacity increased to 500 cc. and interval to 4 hours. Almost complete restoration of muscular power of bladder.*

R. O., age 46. Cigarmaker. Admitted Sept. 17, 1897.

Complaint. Frequent micturition, every fifteen minutes.

Past History. Gonorrhœa twice, but no bladder trouble with it. Syphilis 15 years ago. Positive history of secondaries and tertiaries. Took K. I. very irregularly for three years, after which cutaneous lesions disappeared. In 1891 pains and sores returned, and again he took treatment irregularly.

In 1895 had a stroke of paralysis. Girdle sensation around body at level of navel, left leg completely paralyzed, right only partially. Retention of urine, incontinence of fæces. After being catheterized for 2 months began to have incontinence of urine. Urine became very foul. Patient took heavy doses of K. I. and in two months power of limbs began to improve, and in 4 months he could walk fairly well. Bladder trouble did not improve, but urine continued to be voided involuntarily in small amounts, and patient has worn a rubber urinal to catch urine.

Status Præsens. Voids urine every 10–15 minutes. No pain or dysuria. Wears urinal by day. Catheterizes himself three times at night, as by so doing he does not void so frequently. After catheterization can hold urine for half an hour.

Rectum. Has fairly good control of bowel, except when fæces are very liquid.

Examination. Knee jerks increased activity, muscular power of left leg weaker than right. Prepuce, glans and skin of penis excoriated from use of urinal. Meatus small. Searcher passed easily into bladder. No stricture. No prostatic enlargement. Record shows that 40 cc. is largest amount of urine voided, and generally 20 cc. Bladder small, capacity 40 cc., walls rough, manipulation of searcher causes hemorrhage. Urine withdrawn acid and very purulent.

When forcibly distended until painful bladder holds 65 cc.; on second trial 70 cc. forced in. Distension causes hemorrhage. Two days later 120 cc. could be forced in with considerable pressure. The bladder in this case is more easily dilatable than others. Bladder is forcibly distended with fluid four times daily without catheter by hydraulic pressure. K. I., which patient has been taking regularly before entrance, is continued.

Note.—Following this treatment the improvement of bladder was marked, capacity and interval rapidly increased, and with it the patient regained more and more control over micturition.

The following table shows the rapidity of improvement:

Date.	Day of Treatment.	Capacity of Bladder. Largest amount held on forced distension.	Urine. Largest amount voided at one time.	Interval. Average time between urinations.		Remarks.—Case VIII.
		Cu. Cm.	Cu Cm.	H.	Min.	
Sept. 18.....		70	40		22	Paralysis 2 years ago. Retention of urine. Catheterization. Cystitis. Incontinence of urine. Gradually increasing contracture of bladder. Urine now voided involuntarily every twenty minutes. Forcible irrigations begun, four times daily. Thompson's fluid.
" 19.....	2	120	40		35	
" 20.....		200	100		55	Much improved.
" 22.....	5	270	100	1	45	Power of voluntary control returning.
" 24.....	7	320	100	2	00	
" 27.....	9	340	140	2	00	Voids urine more frequently at night than during the day.
" 30.....	12	435	175	2	45	Condition markedly improved. Can now hold urine often for three hours and void at pleasure. Has given up use of urinal. No more dribbling. Has not fully regained expulsive power of bladder. Has 120 cc. residual, but muscular tonus is improving daily. Patient became insubordinate and was discharged.

Feb. 3, 1898. Patient returns to genito-urinary dispensary asking to be treated. Has not been under treatment since he left hospital (several months ago). Bladder has retained its size, patient voids urine at will, no dribbling, but still has a moderate residual. Still uses catheter from habit. Urine acid, pus moderate in amount. Prostate not enlarged.

Feb. 26. Condition as in last note. Irrigation bag prescribed to irrigate bladder without catheter three times a day with boric acid solution. Instructed to discontinue catheter habit.

Feb. 28. Has discontinued catheter and finds that he can hold his urine 4 hours during day. Bladder holds about 500 cc.

Mar. 29. Patient has irrigated bladder with boric solution twice daily. Bladder holds 580 cc. During day urine is voided every 3½ hours in amounts varying from 70 to 130 cc. After voiding a residual of 100 cc. is present. Expulsive power of bladder still defective. Still walks with a limp, rectal control not perfect, still taking iodides.

Remarks.—The results obtained in this unpromising case are very satisfactory and show the improvement of muscular tonus and continence obtainable by the exercise of the muscle. The gain in capacity of bladder was also marked.

Technique of Irrigating the Bladder without Catheter. Articles Necessary.—An ordinary fountain syringe with tube about eight feet long, a conical nozzle which will fit tightly into the meatus but not injure the urethral mucous membrane, and a pole or other apparatus by which the irrigating bag may be elevated or lowered as desired. (A nail in the wall will answer the purpose.)

The patient should lie on his back on a bed or couch which is covered by an oilcloth, with a basin between his legs. The operator stands on the right side, takes the penis between thumb and finger of his left hand, the sterile nozzle in his right. The foreskin is retracted, and with the bag elevated three or four feet, the fluid is allowed to play upon glans penis and meatus. The urethra is alternately distended with fluid and emptied to clean the anterior urethra, and the nozzle is then crowded tightly into the meatus, the bag raised to an elevation of about seven feet, the penis being held just back of the corona so as not to compress the urethra, as shown in Fig. 4. Valentine's complicated nozzle and stop-cock are unnecessary.

The urethra will soon become ballooned out and for a time the fluid will be seen to stop flowing through the nozzle, but very soon the sphincters will give way and a "purling" sensation be conveyed to the hand by the fluid flowing into the bladder. After the sphincters are overcome very little pressure is required to force fluid into the bladder, and it is best to lower to a height of four and a half or five feet, as too much pressure may produce spasm of the bladder and prevent dilatation.

As the fluid flows gently into bladder the patient will soon experience a sense of fulness and then of gradually increasing pain.

In cases of contracture where systematic dilatation is to be adopted, the distension must be continued until pain is very considerable and the patient tells you he cannot "stand any more." The tube is then squeezed to cut off the flow, the nozzle withdrawn, and the fluid, which is ejected with considerable force, caught in a half-litre glass or other receptacle.

The operation is repeated until the quart of fluid has been used.

The procedure is so simple that patients soon learn to conduct their own treatment. They always become intensely interested in the progress of the dilatation and vie with each other as to the amount of fluid and urine held.*

Solutions Used.—Very bland fluids are the most satisfactory in most cases. Best of all is Thompson's fluid, which is composed of borax, glycerine, sodium chloride and water. It is the most soothing preparation for any inflamed mucous membrane that we know of. Boric acid in 2 per cent. solution is excellent.

A very good plan is to use occasionally a stronger antiseptic fluid, such as silver nitrate gr. ½ to ℥i, or bichloride of mercury 1 to 150,000 solution, up to 1 to 50,000.

When four or five irrigations are given daily it is well to use one of these once daily, followed by a weaker solution.

Silver nitrate is especially effective where an ulcerative condition of the mucous membrane exists.

Very little internal treatment is of value. Boric acid or salol in gr. v–x doses may be given if the urine is alkaline, and citrate of potassium when hyperacidity causes much burning.

The reaction of the urine in cystitis depends almost entirely on the character of bacterium present, and it is irrational to attempt to change its reaction by internal drugs.

As shown in these cases, the urine becomes acid as the bladder inflammation begins to subside.

Contracture of the Bladder. How produced.—As in inflammation elsewhere, there is at first a proliferation and infiltration of round cells, which as time goes on become more and more spindle-shaped and finally form fibrous tissue. Ulcerative areas in the mucous membrane also lead to the production of scar tissue, with its inherent tendency to contract. The inflamed mucous membrane, irritated by the presence of urine, expels it frequently; the bladder is therefore never fully distended and offers no resistance to the contraction of the scar tissue, and contracture results. In this process the blood supply of mucosa is greatly interfered with, and the mucous membrane is thrown into folds and pockets which retain the purulent exudate, thus adding to the inflammation.

The effect of forced dilatation with fluids is probably as follows:

Irritating secretions are washed away.

The individual bundles of fibrous tissue are separated or loosened, allowing increased vascularity.

Folds and pockets of mucous membrane are smoothed out. Ulcers are stretched and cracked, allowing new blood-vessels to grow out, in precisely the same way that leg ulcers are cured by scarification. The bladder muscle is exercised and the tone is improved. The mucous membrane cleaned, stretched, and with increased vascularity, is given a chance to throw off the inflammation.

In a normal empty bladder the epithelium is several layers thick, but when fully distended is said to be only one layer thick. Dilatation of an inflamed bladder therefore gives the antiseptic fluids a better chance to reach the disease.

Conclusions.

Cases II, V, VI, and VIII may be taken as examples of what can be accomplished toward dilating a contracted bladder and restoring the normal frequency and power of urination. The improvement in case V is really wonderful.

A review of these cases shows:

That it is possible to restore the capacity of a bladder contracted by chronic inflammation of the worst character, by systematic distension by hydraulic pressure.

That such dilatation has a most beneficial effect on the vesical inflammation and muscular tonicity.

That the number of urinations daily may thus be greatly diminished.

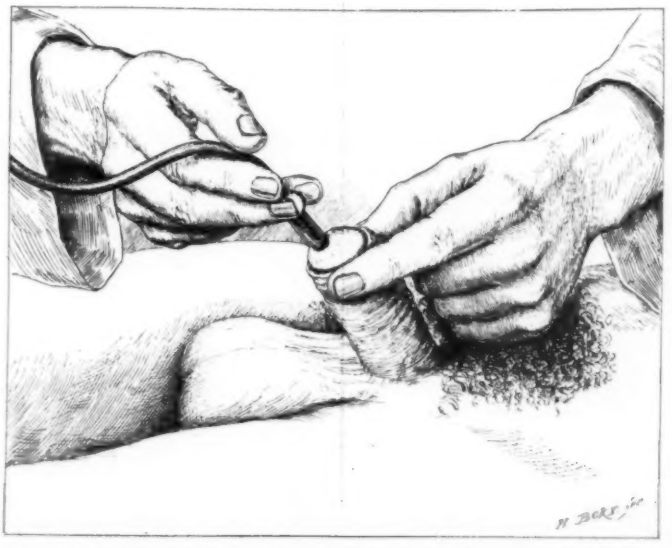
That no ill effects are produced by considerable hydraulic pressure, and there is no danger of infecting the kidney.

One of the most striking features of the treatment is the rapidity with which patients improve. Pain present for years may disappear in a few days, pus and mucus diminish markedly, and strongly ammoniacal urine become acid in a short time.

* Up to a few months ago there was scarcely anything on the possibility of irrigating the bladder without catheter in American literature, but since the popularization of the so-called Janet method of treating gonorrhœa, it has been very widely employed. Janet deserves credit for the energetic way in which he has lauded the virtues of copious irrigations of dilute antiseptics, but the only originality is in the substitution of permanganate for bichloride in Dr. Halsted's method.

EQUIPMENT FOR IRRIGATIONS AT THE GENITO-URINARY DISPENSARY OF THE JOHNS HOPKINS HOSPITAL.

1. Bottles containing stock solutions of Bichloride of Mercury, Silver Nitrate, Boric Acid and Thompson's Fluid.
2. Copper reservoir of sterile water kept at proper temperature by a Bunsen burner.
3. Printed formulæ for making up various irrigations.
4. Irrigators suspended from pulleys, 13 feet above the floor, the right hand for anterior urethral and the left hand for intravesical irrigations.
5. Halsted's table for Genito-Urinary work.



METHOD OF HOLDING PENIS AND NOZZLE FOR BLADDER IRRIGATIONS.

The tube passes between thumb and forefinger so the flow can be regulated at will. The nozzle is held firmly with the other fingers.

And yet a late text-book on genito-urinary diseases says as follows:

"The theory that the capacity of an inflamed bladder can be increased by dilatation is contrary to physiology and anatomy. To attempt by forced injections to relieve frequent micturition cannot be too strongly condemned."

Discussion.

Dr. Cullen.—I have been much gratified with Dr. Young's method, and it is certainly destined to be of great service not only in the male but also in the treatment of cystitis in women. Last summer we had quite a number of cases showing varying degrees of vesical inflammation, and I had the opportunity of testing the efficacy of the treatment as outlined by Dr. Young. In all, with the exception of one case, much improvement followed, and subsequent examination proved that this patient was suffering from tuberculosis of the bladder, as demonstrated by sections of the bladder wall. One marked case is especially worthy of mention.

A patient (Gynecological No. 5351) was admitted to the Johns Hopkins Hospital on June 25th, 1897, complaining of frequent and painful micturition. Eight years ago she gave indefinite signs of renal colic, and the urine contained blood for two months, since which time the urine has been blood-tinged on an average every three months for 3 or 4 days, and during the greater part of the eight years micturition has been frequent and painful.

On admission the patient micturates very frequently, at times every few minutes, and has to rise eight or more times during the night, often so frequently that she no sooner gets to sleep than the desire to micturate wakes her up. The pain is most severe after the bladder is empty, and she feels as if the viscus contains a stone.

Examination under ether, June 26th. The urethra easily admits a No. 11 cystoscope. The base and the anterior surface of the bladder are red, injected and covered by whitish yellow patches which on removal are found to be composed of mucus and calcareous particles. On examining more closely these areas are found to be covered with ulcerations, and the calcareous particles occupy the centres of the excavations. The lateral bladder walls are normal, and bimanual palpation fails to reveal any calculus.

The patient was treated by irrigations with HCl, to dissolve the calcareous particles, and the hydrochloric acid was removed by washing out with boracic acid solution, and after the bladder was emptied, by the application of 10 per cent. ichthyol.

June 29th. Patient being in knee-chest position, the bladder was irrigated with 1-1000 HCl, followed by boracic acid solution and then 10 per cent. ichthyol, to ensure the widespread application of which Clark's vesical balloon was introduced. The distension caused by the rubber balloon gave great pain.

June 30th. Topical application of ichthyol to the bladder after irrigation with HCl and boracic acid solution was made.

July 2nd. Irrigation with HCl and boracic acid was repeated. The treatment is very painful, but the patient says that she already feels improvement. Frequent irrigations were employed, and on July 10th the following note was made: "All the calcareous particles have disappeared, and the mucosa, while still red and injected, has materially improved. The solution of HCl was now discontinued, and the bladder was washed out three times a week with the boracic solution, and then 10 per cent. ichthyol applied with or without the balloon."

July 16th. The posterior and anterior surfaces of the bladder are much improved, but on examination of the base just within the inner orifice of the urethra several white calcareous patches are seen. With the patient in the knee-chest posture the HCl had evidently not come in contact with those areas. After several irrigations with the patient in the dorsal position these disappeared.

July 31st. The bladder has not been treated for eight days and a marked improvement is seen. The areas of ulceration at the trigonum are still covered by pus, which can, however, be easily removed by the applicator.

As the bladder mucosa did not assume its normal appearance as rapidly as we had hoped, dilatation of the bladder was commenced, with forced irrigations of boracic acid. The following amounts were injected each day:

August	4th,	160 cc.	August	13th,	250 cc.
"	5th,	170	"	14th,	260
"	6th,	180	"	15th,	270
"	7th,	190	"	18th,	180
"	8th,	200	"	20th,	200
"	9th,	210	"	21st,	210
"	10th,	220	"	22nd,	200
"	11th,	230	"	23rd,	250
"	12th,	240			

It will be seen that the dilatation was progressive up to the 15th, and then after a cessation of three days the bladder did not contain as much, but that in a very short time the maximum amount was again nearly reached. In this patient the amelioration of the symptoms was most marked. Micturition became less and less frequent, and the urine could be held from two to four hours. The pain likewise ceased, and she rose once or twice only at night.

On leaving the hospital on September 8th the patient felt comparatively well and had practically no trouble with the urine. I received a letter from her three months afterward and learned that she was doing her home-work and was feeling well. (See charts of cases appended).

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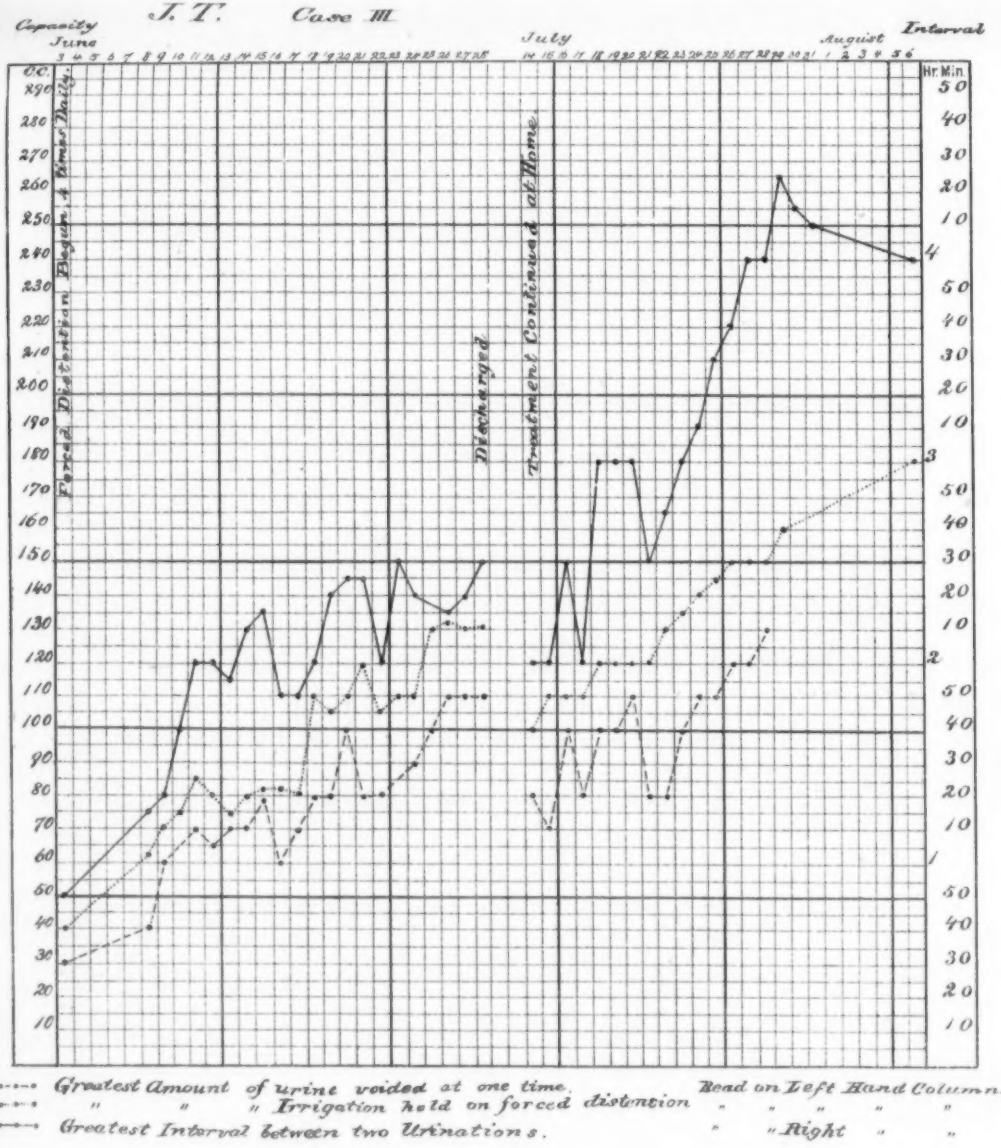
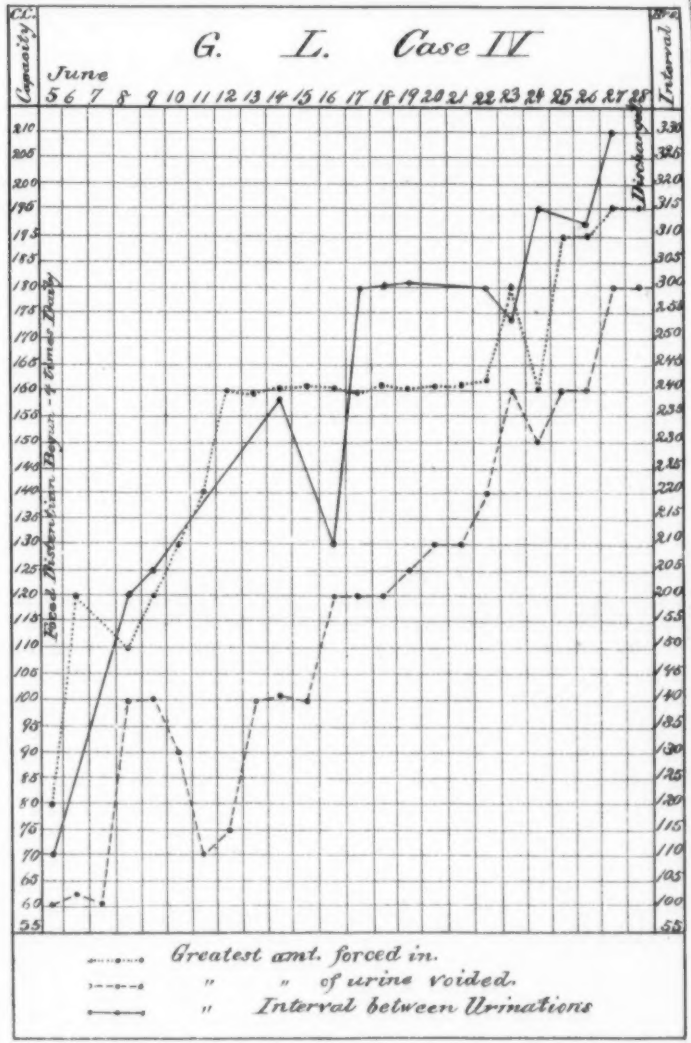
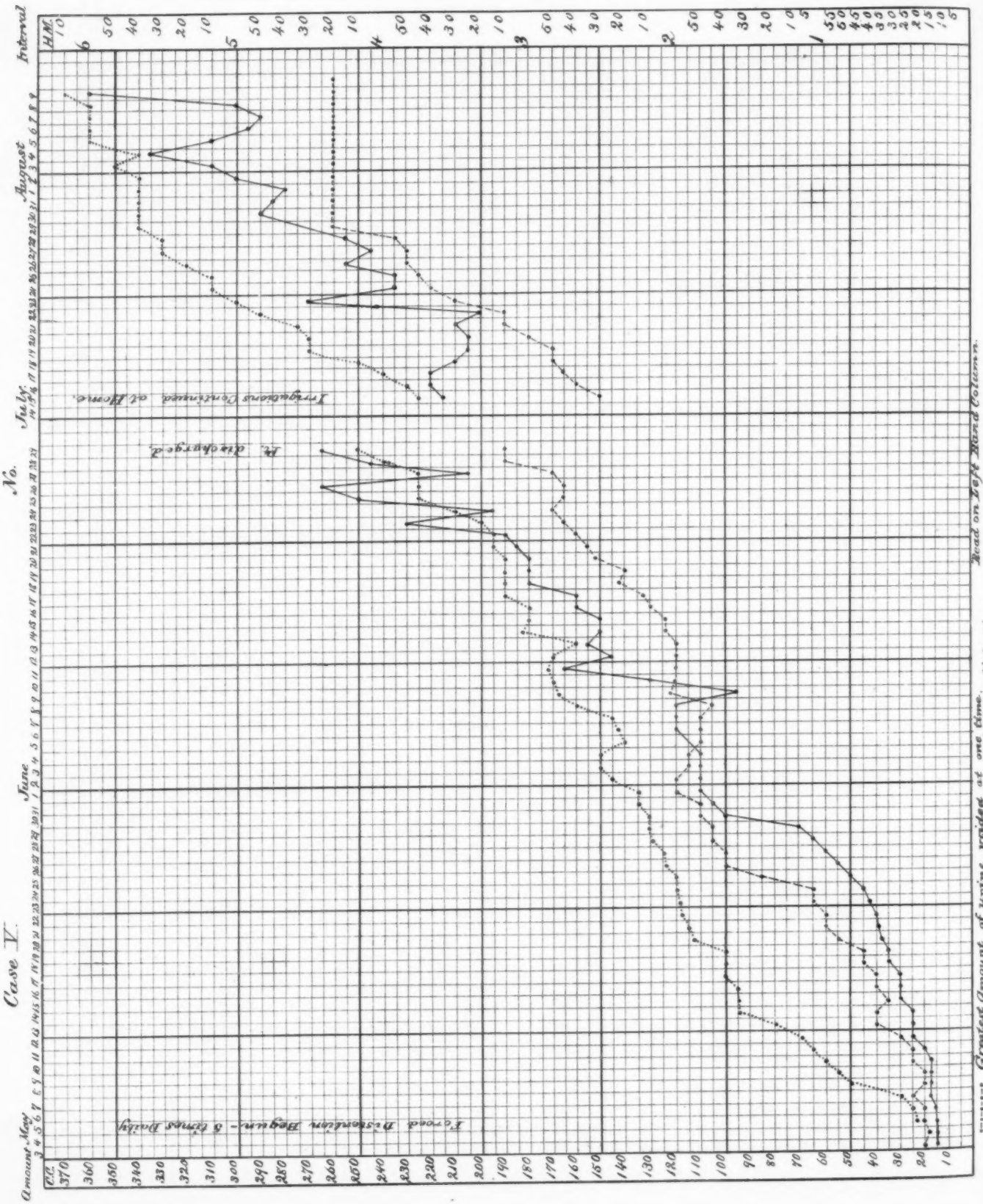
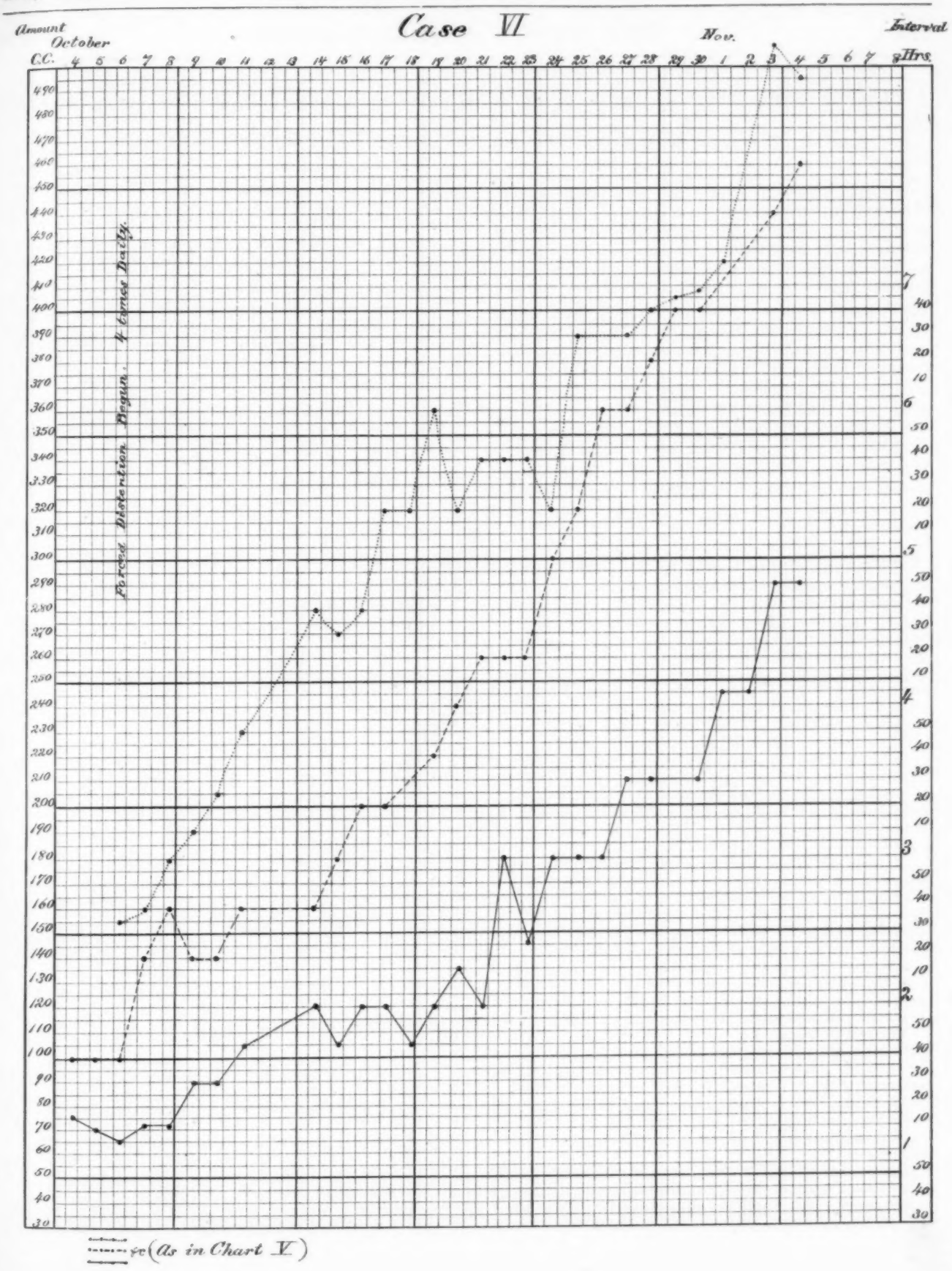




NOTE.—The accompanying charts show graphically the progress of some of these cases; *e. g.* in case V, on May 3, the greatest amount of urine voided at a time was 20 cc. (read on left), and the longest interval between two urinations was 15 minutes (read on right). On May 5 bladder was forcibly distended but held only 23 cc. The capacity, however, steadily increased under forced irrigations, being 50 cc. on May 8; 100 cc. on May 15, and 370 cc. August 9. The amount of urine voided, and the interval increased correspondingly from day to day: May 13, 40 cc. with 25 minutes interval; May 27, 100 cc., 1 hr. interval, and finally during August 260 cc. with interval between 5 and 6 hrs.


Case V.
No.
Amount
Interval
Forced Dilatation Begun - 6 times Daily
Irrigations Continued at Home.
Discharged.
Read on Left Hand Column.
Greatest Amount of urine voided at one time.
" " Irrigation held on forced dilatation
" " Greatest Interval between two Urinations.
" " Right
" "


Case VI
Amount
October
Nov.
Interval
C.C.
Hrs.
Forced Distention Begun. 4 times Daily.
cc (As in Chart V.)

A CASE OF CARCINOMA METASTASES IN BONE FROM A PRIMARY TUMOR OF THE PROSTATE.

By Sydney M. Cone, M. D., *Assistant in Surgical Pathology, The Johns Hopkins University.*

Von Recklinghausen[1] writes of osteoplastic changes in bone accompanying metastases from primary carcinoma of the prostate. He compares the changes with fibrous ostitis and osteomalacia of bone, and makes many valuable additions to our knowledge of the gross and microscopic structure of bone in disease. He records five cases of his own and refers to one case of carcinoma of the prostate with subsequent metastases in the vertebræ—that of Sir Henry Thompson.[2] This case is reported in full in the Transactions of the Pathological Society of London, in 1854, Vol. V, p. 204, with a pathological report by J. Hutchinson. Saase[3] has recently reported a similar case and gives a comprehensive view of the work of Von Recklinghausen in this report.

The case I am going to report does not differ in any essentials from those previously reported, but is interesting as confirming several very important points in the pathology of bone, and discrediting the existence of primary carcinoma of the osseous system.

The patient, W. B. M., aged 75, white, was admitted to Dr. Halsted's wards in the Johns Hopkins Hospital, in September, 1895, suffering with cystitis, and was discharged October 10th, improved. He returned December 26, 1896, complaining of a painful swelling over his right tibia; he also had symptoms of cystitis with incontinence of urine. Notes made at this time by Dr. Young refer to the great enlargement of the prostate and probable existence of a tumor. Careful examination excluded the existence of tumor of any other organs. On January 5, 1897, Dr. Halsted amputated the leg and the patient made an uninterrupted recovery, returning to his home in February.

The gross appearance of the tumor of the tibia suggested to the operator carcinoma. Sections were made at once after boiling and immediate decalcification in concentrated hydrochloric acid. The appearance of these sections suggested endothelioma. Even the later results of microscopic examination showed the pictures illustrating Marckwald's[4] article on "Multiple intravascular endotheliomas in the whole bony skeleton."

Not being sure of a primary carcinoma existing in the prostate, and disbelieving the existence of primary carcinoma in bone, Marckwald's explanation seemed to be a good one. He refers, however, to the ease with which his endothelioma might be mistaken for carcinoma. Von Recklinghausen likewise mentions how readily one might mistake one of his cases for endothelioma.

When seen at his home in July the patient was very much emaciated, having lost about 30 pounds in weight. He complained of pain in his back, chest and right hip. His urinary symptoms had improved under treatment. The patient died September 12, 1897.

Autopsy. A man of large frame, very much emaciated. The stump of the right leg is covered by a pad of dense scar tissue, otherwise the leg is normal. There are no external marks to indicate tumor formation, except a few dark moles over his back and abdomen (these existed for years, according to the history). On firm palpation a nodule is felt at the right iliac crest within the pelvis. Another spindle-shaped mass can be felt over the second rib on the right side.

Examination of the abdominal viscera reveals no abnormalities except in the pelvis, where the prostate is found very much enlarged and adherent posteriorly to surrounding structures; elsewhere it is sharply circumscribed. The prostate measures 6x5x5 cm. The lateral lobes are symmetrically enlarged and measure 3 cm. in diameter. The middle lobe measures 3x1.5 cm. and seems continuous with surrounding structures.

Section of the lateral lobes shows a firm surface variable in appearance. There are bulging, gray, translucent areas and yellow, soft, expressible dots between the firmer, opaque stroma which makes up the greater mass of the gland. The middle lobe presents quite a different picture. It varies in different parts. The greater portion is soft, with a varying cut surface—yellow, soft, pus-like material being enclosed by a thin, opaque, fibrous stroma. The greater portion of this soft pulpy tissue is posterior, away from the urethra, and infiltrates the surrounding structures. The tissues about the middle lobe cannot be differentiated from one another, and no distinct pelvic lymphatic glands are to be seen, all being matted in a firm fibrous mass. The glands along the vertebræ are firm but do not show metastases. The prostatic and hemorrhoidal veins are plugged with phleboliths. The seminal vesicles are enclosed in a dense fibrous tissue.

The bones which show greatest evidence of disease are the second, third and fourth lumbar vertebræ, the second rib and the ilium. The vertebræ bulge laterally and anteriorly and can be easily penetrated by a knife blade. The rib presents a symmetrical spindle-shaped enlargement, bulging for the most part into the pleural cavity. It is covered by periosteum and pleura. The pleuræ are adherent at this point. The bone is rough beneath the periosteum and can be easily penetrated. It measures at its greatest diameter 4 cm.

Section through the rib shows a stalactitic growth of bone into the pleural cavity, the plates appearing smooth and asbestos-like. The remaining bone is granular and presents no symmetry in its arrangement. Between the plates of bone is seen a soft white material in dots and fixed in a smooth, shining lining wall. There are cysts between the plates of bone just beneath the periosteum and in the granular bone. The lining wall of these cysts shows a thin, shining, smooth surface 1 to 2 mm. in thickness. About these cysts the bone in the granular areas is denser than elsewhere. The appearance of the granular bone varies in color from a reddish to a dark brown and it contains lighter white dots. The bone is very friable. The stalactitic growths seem to be directly continuous with the granular central bone and push the periosteum ahead. There is no evidence of periosteal new-bone formation in the ribs.

The node on the ilium projects 1.5 cm. and has a diameter of 2 cm. It is covered by thickened periosteum. There is a central white, softer, fibrous mass surrounded by granular bone like that in the rib. The rim of the nodule is made up of plates of bone, asbestos-like in appearance; these seem to grow from the periosteum. In this bone is seen the white tissue described in the rib.

The vertebræ show none of the flat plates of bone, but present the same granular new growth of bone seen in the rib and the ilium. There is no spongy bone with branching cancelli in any of the new growths of bone described.

An enlarged gland alongside the trachea is for the most part firm and darkly pigmented. It contains a well-circumscribed area, white in color (this proved to be carcinoma). There is a cystic dilatation at one end of the gland filled with a dark reddish fluid (this is microscopically a cyst lined by epithelial cells such as were found in the bone and prostate). One of the abdominal lymph glands attached to the vertebra is firm, whitish-gray in color and homogeneous on section.

Description of the Tumor in the Tibia.—Six cm. from the internal malleolus and on the anterior aspect of the tibia, lying under the

periosteum, is a bulging tumor measuring 4 cm. in diameter. The shaft of the bone beneath the bulging mass is eroded, and the tumor seems continuous with a mass filling the medullary cavity. This medullary mass is an irregular mixture of bony spicules, hemorrhagic soft tissue, dark brown, soft, friable tissue with a sprinkling of gray, pin-head-sized areas throughout. This tissue fades into a more homogeneous, gelatinous, gray substance with intervening cancelli of bone, as it approaches the periosteum. The cortex is destroyed and the new growth spreads itself beneath the thickened periosteum, between it and the dense cortical bone, above and below the place where it has found its way out. This bone is irregularly eroded where the tumor growth appears. Perpendicular to the shaft and situated between the light soft masses are bone lamellæ, formed from the periosteum and intimately associated with it. Sections of this tissue fixed in boiling water and decalcified at once in concentrated muriatic acid, show epithelial cells forming a mosaic between the cancelli of new bone which are directly continuous with bands of connective tissue of the periosteum.

The microscopical examination of the prostate gland shows a great hyperplasia of the muscular elements in the lateral lobes and a proliferation of the glandular element. Some of the gland tubules are filled with loose masses of epithelial cells and alveoli of cells. Others are lined by one and two layers of cuboidal cells with a deeply stained round nucleus at the base. There is a clear refractive space or several refractile globules next the lumen. In the middle lobe all of the spaces are filled with cells in various stages of degeneration. Very few normal tubules are to be seen. Some few spaces are paved as if by a mosaic. There are few real tubules—it resembles more a meshwork of fibrous structure in which the tissue has condensed about large polygonal fenestræ, most of which are full of cells, loose and in tubular arrangement. These spaces are uniform in size, being about the size of an air vesicle of the lung; they are bounded by a condensation of the fibrous and muscular tissue of the prostate. Some of the spaces communicate with one another and give the appearance of a breaking-down of tissue by masses of cells which seem to invade the tissues at these parts.

In describing the microscopic appearance of the tumor as it appears in the prostate, bones and bronchial lymph gland, there are so many points in common that one description will suffice. Two appearances are presented by the tumor—first, a tubular adenomatous growth, cystic in places; second, a conglomerate mass of cells which have lost their arrangement in tubules. This latter gives the impression of round cell infiltration or lymphoid nodules—the cells having lost their cylindrical or cuboidal shape and the nuclei staining quite deeply and appearing homogeneous. At the outskirts of these masses there may be seen the type of cell lining the alveoli and cysts. The tubular form of the tumor is best demonstrated in the bones and the bronchial lymph gland, but can also be seen in the blood-vessels of the prostatic plexus and in the primary tumor. There is very little stroma between the tubules; the lumina are seldom seen patulous, for the cells project into them, cylindrical in shape, meeting one another in the middle line. The nuclei are situated at the base of the cells and are perfectly round, deeply staining and homogeneous in character. It is this situation of the nuclei which aids one in distinguishing the lumen from the delicate stroma which may be wanting. The character of the cells is that of the cell lining the prostate gland tubules, only they vary in shape as already stated. Another characteristic is the vacuolization and division of the clear zone situated toward the lumen into small clear spherical globules. These are sometimes so uniform in size as to give the appearance of "shadows" of red blood corpuscles filling dilated alveoli. It may be stated here that some of the alveoli are seen filled with red blood cells, causing a close resemblance to endothelioma.

As to the individual sections it may be stated that the bladder wall shows evidence of chronic inflammation, its walls being infiltrated with round cells and showing connective tissue increase; there is no carcinoma in its walls. In the tissue posterior to the prostate is a tumor filling the blood-vessels and invading the structures surrounding them. The lymph glands show connective tissue growth, but no tumor in them. One of the largest vessels filled with the cells shows a peripheral mass of cells in tubular arrangement lining the vessel wall; toward the central lumen and surrounding a blood clot are numerous cells, massed in such numbers as to give the appearance of round cell infiltration. In none of these sections are polymorphonuclears present. A gland attached to the vertebra shows a marked proliferation of its endothelium and formation of fibrous tissue along the lymph spaces; there is no evidence of metastases here. The gland next the bifurcation of the trachea shows a branching network of tubules, lined by cuboidal and cylindrical cells, through a blood clot. Blood pigment is situated in the dense connective tissue about the gland. A cyst has formed at one end of the gland and is lined by cylindrical epithelium one layer deep; it resembles the cysts in the bones.

For histological study the new-formed bone about the cysts in the rib is most interesting. The lining is of cylindrical cells on a thin fibrous tissue in which are scattered little areas of cells arranged in alveoli. The alveoli are more or less dilated in various stages of cyst formation. This same appearance is presented among the cancelli of new bone branching about the outer wall of the cyst. In fact, wherever there are new bone cancelli one sees tumor formation. The cells in these tubules come in contact with the bone—in places grooving the same. Commonly there is a fibrous tissue intervening between tubules and bone cancelli, and osteoclasts fill the grooves in the bone. The spaces between the cancelli, when not containing epithelial masses, are filled with a vascular connective tissue. The nodule in the ilium, besides showing the appearances of a tumor in the bone just described, presents a cartilaginous nodule in the midst of denser new bone formation. Even the dense bone contains tumor cells. In the cysts of this section is seen a homogeneous substance deeply stained with eosin and resembling colloid. The usual contents of the dilated tubules are granular with desquamated cells.

The section of the vertebra presents dense new bone, poorly staining granular bone and free trabeculæ in the midst of tubules of epithelial cells. Microscopic examination of the bone removed at the first operation shows a new growth of bone from the periosteum; in the medulla there is evidence of necrosis of the old trabeculæ of the tibia, fragments lying free in the midst of the tumor and refusing to stain. Tubules of epithelial cells lie between the periosteal new-formed trabeculæ.

Some of the observations of Von Recklinghausen which we were able to note in our case are of great interest. He mentions the order in which carcinoma metastases occur in bones as: vertebræ, femora and pelvis, ribs and sternum, humerus, flat bones of the skull, fibula, tibia, radius and ulna. Many interesting observations are made in the different cases described by him which make it seem valuable to mention his individual cases.

Case 1. The first case was in a man aged 75, who entered the hospital because of a large hard tumor of the right forehead; it projected 15 mm. from the bone, and was not adherent to the skin.

The operation consisted in shelling out the tumor, which was easily done, even though it extended to the dura mater. The tissue of the tumor was reddish-white, and was typically alveolar, being made up of hollow tubules and cysts lined by cubical or low cylindrical epithelium.

"A marked vascular connective tissue with alveoli of the

size and form found in the thyroid gland led to the diagnosis carcinoma and to suggest the primary lesion in the thyroid, like in a case described by Cohnheim." The ribs and bones of the skull at their points of thickening were no more easily injured than other bones, yet on the interior of them were found white prominences which proved to be carcinoma. At the trigone of the bladder was seen a flat elevation, made up of separate white pea-sized elevations covered by mucous membrane. The prostate was three times its normal size and surrounded by a bean-shaped connective tissue mass filled with carcinoma nodules.

New bone cancelli of finished or unfinished bone were found not only in the osteophytes outside the bone but also within the medullary spaces of the diploë and spongiosa. Some of these were old decalcified bone, others were new formed. (His methods for determining these points are contained in the same article.) The microscope shows the spicules in the frontal bone tumor to be a new formation and not old decalcified bone. There was great spindle-cell hyperplasia in the spaces of the new bone. Sharply bound cell-nests were held in real alveoli of the poorly fibrous and feebly cellular marrow tissue.

"The new bone formed plates about scattered carcinoma areas, not only as an evidence of reactive irritation at its border, like chains of outposts (guards) formed by the old tissue in the manner of an inflammatory proliferation against an invading enemy, but also as an integral part of the bone tumor even though it was a carcinoma."

In spite of the great ossification and absence of degeneration it was a case of multiple bone carcinoma arising from the prostate as the primary seat of the tumor. The reason for this was that all the tumors contained the type of epithelial cell found in the prostate, and especially because the lymph gland metastases followed the route which the "materia peccans" took from the prostate. It was carried by the blood to the bones alone. There would have been no examination of the other bones had it not been for the peculiarity of the tumor in the frontal bone.

Case 2. A man aged 77 years.

There were small nodules at the neck of the bladder. The prostate was hard. The lymph glands in the lumbar region were hard and contained a milky sap. Those about the jugular vein acted likewise. A cheesy gland was found at the base of the tongue. A string of lymph glands was on the left side of the prostate. A milky juice (carcinomatous) was expressed from the left lobe of the prostate, otherwise there was no degeneration or discoloration. Microscopically it resembled the first case. It was generalized in bone, but not in the soft parts. "On palpating the smooth surface of the tumors in bone one got the sensation of rubbing a file covered by a cloth." Most of the tumors were covered by periosteum. A strong needle pierced the tumor but could not penetrate the surrounding bone. The impression was made that the tumor sprung from the medulla and became secondarily subperiosteal. The axial portions of the spongy bones were the parts mostly involved. The external tumors preferred the rough places on the bones, *i. e.* "where largest vessels came to the surface." One could have thought of osteoma were it not for the microscopic examination. In all spaces, even in the densest bone, were strings and alveoli of cells in mosaic arrangement as in Case 1.

In connection with this case the following points were noted: There were not two distinct diseases growing side by side, but the carcinoma caused the secondary hyperplastic ostitis by the active congestion awakened by its presence. Bone formation was evidenced by these facts:

1. Nuclei of spongy bone with the beginning tumor formation were present; 2. sclerosis and eburnation of the axial spongiosa existed; 3. the ribs and vertebræ showed thickening within the affected areas; 4. the cancelli took up new arrangements, forming stars and appearing as radii in the callus; 5. the osteophytic growths like those seen in spina ventosa.

Case 3. A man, aged 72. Primary carcinoma in the prostate, secondary to the glands along the vertebral column, lungs and bones.

There were white areas in both lobes of the prostate and infiltration of the walls of the seminal vesicles. The areas in the bones appeared white and yellowish-white, and owing to the ill-defined boundaries gave the impression of an "infiltrating growth." Osteosclerosis and osteoporosis went hand in hand. Besides the femora, humeri, iliac bones and vertebræ, the spine of the scapula was also involved. The microscopic appearances were the same as in the other cases. In the lymph glands it was not easy to show alveolar and tubular arrangement of the cells on account of the poor connective tissue framework; one might have diagnosed sarcoma from these sections. "The lung metastases were due to retrograde transport from the bronchial glands."

Case 4. A man, aged 76. Carcinoma of the prostate with metastases to the pelvis, vertebræ, ribs and femora, and doubtful carcinoma of the abdominal lymph glands. The prostate tumor measured 55x30 mm. and resembled a venous angioma.

Case 5. A man, aged 74. Carcinoma of the prostate with regionary metastases to the ureter, bladder and glands; miliary carcinoma of the serous membranes; osteoplastic carcinosis. There was considerable infiltration of the tissues of the pelvis. The prostate was atrophic, measuring 35x20 mm., was hard and white and smooth on section. The glands in the axilla were involved.

Case 6. A skeleton preserved in the museum and described by Lobstein. The conclusion is drawn that it was a case of carcinomatous ostitis probably arising from a primary tumor in the prostate. The conclusion was made from the appearance and location of the osteophytes and endosteal bone formation, together with certain points made by Lobstein from the fresh specimen.

Some of the points peculiar to bone carcinomas obtained from the above cases were summarized under four heads:

1. These were infiltrating in character and because of this resembled inflammatory changes. Because of the diffuse growth the term carcinomatous ostitis was justified.

2. The new bone formation was prominent, the destructive character of the tumor was in the background.

3. The exostoses were seen at the exit of the vessels, while in osteomalacia the ligaments and muscle attachments were preferred.

4. The beginning of the carcinoma was within the bone and broke through from the medulla.

Comparing the changes in this series of cases with those in metastases following carcinoma of the breast, the author mentioned that the contour of the metastases in the latter is usually sharp, but when they become infiltrating, osteoplastic changes occur. Prostatic carcinoma will probably be found to be the cause of general bone carcinosis as often in man as is the mammary carcinoma its origin in women.

It is hard to make out carcinoma in the prostate with the naked eye; the tissue does not degenerate much.

Sir Henry Thompson's case was a man aged 60. The prostate gland was involved in a growth about the size of an orange; some of the adjacent glands were also infiltrated. There were "encephaloid" growths along the lower dorsal vertebræ.

Hutchinson's report on the case is quite full. He refers to the soft creamy material infiltrating the prostatic tissue. A lymph gland on the posterior surface of the bladder presented on section the same creamy material which showed microscopically the same appearance as that from the prostate. In the spinal canal attached to the lamina of a lumbar vertebra was a mass the size of a filbert enclosed in a dense fibrous envelope. This tumor presented the same appearance as the lymph gland except that "it was less succulent." The involvement of the bones seems to differ from the cases described by Von Recklinghausen in not being infiltrating in character. Saase before giving his case discusses the origin of carcinoma in bone; he quotes Von Recklinghausen's work at some length.

The case reported was a man aged 61 years. The diagnosis was not made during his life. The prostate was twice its normal size; pressure expressed a grayish white sap from its cut surface. One of the lymph glands of the pelvis showed metastases; these were located in the hilus, none were in the cortex. The vertebræ cut with ease; the femora were sclerosed in part and were spongy and friable in the lower half. The microscope showed between cancelli of bone cylindrical cells pressed together. No stroma was visible, it being substituted by cancelli and plates of new bone. He differs with Von Recklinghausen, who thinks the origin of the bone tumors to be only from the marrow. The route of the metastases suggested a vascular origin of the tumor, *i. e.* that it was an endothelioma or that the primary tumor was sarcoma.

Von Recklinghausen points out the fact that the tumors of the prostate very readily get into the blood-vessels and spread in this way. Cohnheim[8] made similar observations on tumors of the thyroid (Virch. Arch., No. 68), and two years later (1878) Winiwarter made the statement, "the breaking of carcinomas directly into the veins is more common in thyroid carcinomas than any others. Very often a general infection occurs without intermediate lymph gland involvement. It reminds one more of a general development of sarcoma." Middledorpf,[10] in writing of the bone metastases from thyroid carcinomas, refers to Von Eiselsberg's work and corroborates Cohnheim's view that the tumor grows directly into the veins of the thyroid.

Those who believe in endothelioma in bone have no difficulty in explaining the fact that the bones are involved without a necessary involvement of the lymph glands. Some go so far as to oppose the diagnosis of carcinoma in cases set down as such long ago by such men as Von Recklinghausen. Runge's[5] case, reported in Virch. Arch., No. 66, is a notable example of this fact. It involved the atlas and axis of the spinal column and was diagnosed by Von Recklinghausen as carcinoma. Driessen[6] (Ziegler's Beiträge, Vol. XII, 1893) calls this an endothelioma. He gives a fair exposé of both sides of the subject and reports a number of adenomatous-looking growths of the bones which are endothelial in origin.

The case reported by Marckwald[4] as multiple endothelioma in many of the bones shows numerous points of resemblance to the carcinomas described. The nodules are soft, brown, spherical and seem to originate in the medullary canal and pierce the bone, pushing the periosteum ahead. New bone cancelli are formed in the outgrowths. There is also a dense new bone formation in the medulla and periosteum. There are regular rows of cells, rich in protoplasm and with a large round nucleus. There is little stroma and the whole suggests carcinoma. Red blood corpuscles fill spaces between the epithelium, and these spaces widen greatly in places. Some of the cells are cylindrical and show a broad protoplasmic border next to the lumen. There is no degeneration to be seen. The greatest involvement is in the vertebræ, sternum, ribs and pelvic bones; the skull is also involved. Marchand[11] reports a case of cylindroma of the antrum of Highmore. In this case the lymph glands too were involved. The tumor resembled "the so-called bone carcinomas."

Against the endothelioma idea may be stated the fact that frequently small non-suspected primary foci of carcinoma have been found where least suspected. See for instance Cohnheim's case of goitre giving metastases, and Von Recklinghausen's remarks on the small size of the tumors of the prostate which can give metastases. Geissler[7] cites a case of carcinoma of the scapula excised for a primary bone sarcoma, whereas the autopsy revealed a carcinoma of the bladder, the primary growth.

If one were to depend on the shape of the cell and character of its nucleus in differentiating an endothelial growth from one of epithelial origin it is easily conceivable that he could readily err. Hansemann[9] states that the endothelium in ordinary proliferation looks like epithelium. It becomes cubical and cylindrical and may not have intercellular substance. He can well understand the difficulty Volkmann might have in convincing those not disposed to believe his views about endothelioma, yet he agrees with him. One need only see the diagrams of the capillaries of the uterus of the bat pictured in Böhm and Davidoff's histology to see how confusing this distinction between endothelium and epithelium may become. Orth in his Pathologisch-Anatomische Diagnostik states that by increase in size a hyaline swelling of the endothelium of the greatly multiplied vessels may there appear gland-like canals. These appear in sections as if cut in various positions, causing it to resemble gland very closely.

The literature on the subject of endothelioma is too extensive to bring into the bounds of this paper. The work on the tumors of the parotid promises the best field for clearing up this subject.

This case and those referred to lead us to make the following conclusions:

1. Tumors like carcinoma in bone, without an evident primary focus, must lead one to suspect prostate or thyroid.
2. Endothelioma and carcinoma are not readily distinguished from one another.
3. Statical and traumatic influences are potent in locating the metastases.
4. The new bone formation and location of the metastases are significant of carcinoma of the prostate.
5. The metastases occur by the veins.
6. The organs are rarely the seat of metastases.
7. The pelvic lymph glands may not be involved.
8. Very small nodules of carcinoma may give rise to extensive metastases.
9. There is an extensive new bone formation (osteoplastic carcinosis).

It is due to the kindness of Dr. Branham that we were enabled to get an autopsy and thus prove the origin of the disease. I wish to thank Dr. Livingood for performing the autopsy at the patient's home.

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Description of the Diagrams.

I. Periosteal new bone with thickened periosteum and tumor.

a, thickened periosteum.
b, carcinoma in the periosteum.
c, new formed bone cancelli of periosteal origin.
d, carcinoma between new formed bone cancelli.
e, degenerated carcinomatous area.
f, a blood-vessel.

II. From the medullary cavity of bone.

a, red blood corpuscles filling a dilated alveolus.
b, new formed bone.
c, tumor showing cuboidal and cylindrical cells and cystic dilatation of alveoli.
d, degenerated centre of a carcinomatous area.
e, fibrous tissue between the bone cancelli.

GLOSSITIS IN TYPHOID FEVER, WITH REPORT OF A CASE.

By Thomas McCrae, M. B., *Assistant Resident Physician, The Johns Hopkins Hospital.*

The cases of the occurrence of this complication in typhoid fever reported in the literature appear to be very few, the condition itself being a comparatively rare one. In over 700 cases of typhoid fever treated in the Johns Hopkins Hospital this is the first time that this condition has been found. In the case to be reported it is of especial interest, in that it occurred during convalescence from the original attack and ushered in a relapse.

There are numerous references by the older writers to the association of glossitis with the eruptive fevers. Thus, Kerr, writing on glossitis in a Cyclopedia of Practical Medicine published in London in 1833, speaks of "tumefied states of the tongue which occur in typhoid and various fevers attended with an atonic condition of the system." There are numerous references to glossitis coming on during the course of or in convalescence from acute febrile diseases. Clark in his work on the tongue says, "Indeed, slight attacks of intercurrent glossitis are not infrequent in the course of eruptive fevers." But neither he nor Butlin in his "Diseases of the Tongue" refers to any instance in which it occurred with typhoid fever. No reference to the association of the two was to be found in any of the text-books of medicine. Hoffmann in his book on the pathological conditions in typhoid fever does not speak of it. Sorel[1] in his statistics of 871 cases does not report its occurrence, nor Freundlich in a statistical report of cases in Freiburg. Renou[2] and Gallety-Bosviel,[3] in special articles on the tongue and mouth in typhoid fever, do not mention glossitis. The reports of Berg,[4] Jenner[5] and Studer,[6] embracing the reports of the examinations of 1984 cases, do not speak of it. Holscher,[7] in the statistics of 2000 cases, speaks of "purulent infiltration" of the tongue in three cases, while Dopfer[8] in 927 cases found the same condition in two cases.

Nichols[9] has reported a case of "septic infection in typhoid fever" in which two days before death swelling of the right half of the tongue was noted. The case came to autopsy and the tongue was found red, swollen and glazed in its right half. On section it showed hæmorrhages and small abscesses. Cultures yielded streptococci, staphylococci and the colon bacillus. This may perhaps be the same condition as Holscher and Dopfer have spoken of as "purulent infiltration" of the tongue.

The case reported is from Dr. Osler's clinic in the Johns Hopkins Hospital:

W. U., aged 27, white, dredger. Admitted on November 27, 1897, with a mild attack of typhoid fever. The previous history was unimportant. The attack was quite characteris-

tic—fever, rose spots, enlarged spleen and the Widal reaction all being present. The temperature fell to normal on the 16th day and he made an uninterrupted recovery. He was discharged on December 31, 1897, on the 37th day of his disease, and after 22 days of normal temperature. He seemed perfectly well on discharge.

On January 3, 1898, the fourth day after leaving the hospital, he was re-admitted, complaining of pain in the throat with soreness and swelling of the tongue. He gave a history of having felt well until January 2nd, when he had a chill, soon followed by pain in the head and throat. Swelling of the tongue and behind the jaw accompanied by pain on swallowing also came on. There was no history of the taking of mercury or the application of any irritant. His condition rapidly grew worse until his admission.

On admission—temperature 104.2°, pulse 100, face flushed, the neck full and swollen at the angles of the jaws. The mouth presented a striking picture. The tongue was much swollen, protruding between the teeth and preventing the closing of the mouth. There was a profuse constant flow of saliva. The tongue was red, inflamed, symmetrically enlarged, markedly tender and somewhat indurated as far back as could be felt. No spot of softening could be found. The throat could not be seen. Swallowing was difficult. Cultures were taken from the left half of the tongue by Dr. Gwyn. Bleeding followed the punctures. On the following day the swelling was less and the left half was rather smaller than the right, due probably to the bleeding following the punctures. Two days later there was less swelling, less pain and the mouth could be closed. Three days later the tongue was practically normal.

The temperature, which on admission was 104.2°, fell to normal on the day after admission and then rose gradually each day until it reached 104° on January 7th. With this he had a typical relapse, with continued fever, rose spots and enlarged spleen. This lasted for about two weeks and was mild throughout. The temperature fell to normal on the 16th day of the relapse and he was discharged well on January 26th. The cultures from the tongue were negative.

In this case after 24 days of normal temperature the glossitis seemed to be the first symptom of the relapse. The relapse itself was mild save for the severe onset, and as soon as the swelling subsided the patient had no further trouble in swallowing or distress of any kind. The diminution of the swelling in the left half of the tongue after the blood removed in taking the cultures supports the value of the treatment advised in severe cases, namely, free incisions into the substance of the tongue.

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PROCEEDINGS OF SOCIETIES.

THE JOHNS HOPKINS HOSPITAL MEDICAL SOCIETY.

Meeting of February 21, 1898.

The meeting was called to order by the President, Dr. Barker.

The Bacteriology of Yellow Fever.—Dr. GEO. M. STERNBERG, of Washington.

[Dr. Sternberg gave an interesting review of his bacteriological studies in yellow fever and illustrated his remarks by many excellent lantern slides. As the address was unwritten we regret that it cannot be reproduced.—EDITOR.]

DISCUSSION.

Dr. WELCH.—Dr. Sternberg has presented to us in a most interesting way the history and present status of the bacteriology of yellow fever. Incidentally he spoke of his observation that organs taken fresh from the body and at once wrapped in cloths soaked with sublimate solution frequently show within forty-eight hours development of bacteria in their interior. This is in accordance with our experience. Several years ago Dr. C. O. Miller in my laboratory removed with antiseptic precautions from recently killed animals the liver, spleen, kidneys and other organs and threw them entire into solutions of sublimate as strong as 1 to 500. Often bacteria developed in the interior of these organs, especially often in the liver.

Dr. Sternberg's bacteriological studies of yellow fever are generally recognized as most trustworthy. He successfully disproved the claims of the numerous alleged discoverers of the specific organism of this disease. Dr. Sternberg's attitude of caution as to the acceptance of Sanarelli's bacillus icteroides as the causative agent of yellow fever seems to me entirely warranted in the present state of the evidence. It may be demonstrated that this bacillus is the cause of the disease, but the matter is still open to debate. Weak points in the evidence thus far are the small number of cases of yellow fever examined by Sanarelli and the failure to demonstrate his bacillus in nearly half of his cases. His explanation of this failure does not seem to me entirely satisfactory. The results of inoculation of animals by this bacillus are regarded by Sanarelli as a main support of his conclusions, but suggestive and striking as these results are they do not suffice to warrant the statement that yellow fever has been produced experimentally by

inoculation of Sanarelli's bacillus. The remarkable necroses of the liver, of which Dr. Sternberg has shown photographs, may be caused by inoculation with many kinds of bacteria as well as by various toxins.

Probably the strongest argument at present in support of Sanarelli's bacillus as the cause of yellow fever is its agglutination by the blood of yellow fever patients, but here also further observations are needed.

Dr. BOOKER.—The interesting review Dr. Sternberg has given us of his work on yellow fever is a pleasant reminder to me of the time we worked together, in the pathological laboratory of this institution, upon our respective investigations on yellow fever and the summer diarrhœas of infants. Some of the illustrations Dr. Sternberg has exhibited to-night are familiar objects in my work, and it is interesting to note the points of resemblance of some of the toxic lesions and the bacteria found in the two diseases. His picture of the kidney might well be used to represent the condition of this organ in fatal cases of summer diarrhœa. Degeneration of tubular epithelium occurred in nearly all of my cases, and hyaline tube casts were found in the tubules in many cases. The form of degeneration he has represented for the liver in yellow fever I have not seen, but other kinds of degeneration of the liver are often found in fatal cases of summer diarrhœa. We frequently made comparison of the bacteria isolated from our cases, and among other bacteria which showed resemblance was a strongly pathogenic bacillus isolated by Dr. Sternberg from yellow fever patients in Decatur, and, at first, thought to be of considerable importance, which proved to be identical with bacillus *a* of my series. It is a liquefying bacillus, and causes diarrhœa convulsions, and death when injected subcutaneously in rabbits. When the identity of the two organisms was established Dr. Sternberg abandoned its study, and soon afterwards became interested in bacillus *x*, which he has just described to us, and which did not resemble any of the bacteria found in my cases.

Although Dr. Sternberg removed from the laboratory before the study of this organism was completed, I remember that he was greatly impressed with its importance, and considered it, even then, to be highly promising.

The rosette colony which he described as a rare growth for the colon bacillus isolated from his yellow fever cases was frequently seen in the cultures of the colon bacillus isolated from the feces of infants affected with summer diarrhœa, especially when the cultures were made in old gelatine.

NOTES ON NEW BOOKS.

Diseases of the Stomach. By JOHN C. HEMMETER, M. B., M. D., PH. D. (*P. Blakiston, Sons & Co., Philadelphia*, 1897.)

This large volume of 788 pages is prefaced by an introductory chapter in which Prof. Da Costa is quoted as having said that "books attract books, and, as a rule, any new work in any particular class has a striking familiar resemblance to those already published." The author, in justification of the publication of this work, remarks that "if this new contribution to the pathology and treatment of organic diseases of the stomach does not conform to Da Costa's generalization, it is not because of any premeditated plan to make it different from other works on the same subject, but because a number of entirely new methods of diagnosis have entered into it, and because an attempt has been made to do justice to the work of American clinicians in this department." Attention is drawn to the extensive contributions made to our knowledge of the normal and diseased stomach and its functions by the clinicians, surgeons, pathologists, anatomists and physiologists of America.

The work of the publishers has been well executed, the paper and printing being excellent, while the figures and plates, which are quite numerous, have been well reproduced.

The subject-matter is divided into three parts, all of which are more or less closely related. In each division the various subjects are dealt with in detail.

Part I, which is subdivided into nineteen chapters, deals with the "Anatomy and Physiology of the Digestive Organs.—Methods and Technics of Diagnosis." In the chapter on the "Histology of the Stomach" extensive quotations are made from the valuable contributions of Mall and of Bensley on this subject, and two beautiful colored plates devised by Mall on the block system for showing the vascular and lymphatic supply of the various coats of the stomach are reproduced.

The originality of the author is more amply illustrated in this than in any other part of the work. Among others, reference may be made to his method of intubating the duodenum to obtain the intestinal contents; to his device for determining the capacity of the stomach by the use of a dilatable intragastric rubber bag having the general form of the stomach, the capacity being indicated by the amount of air required to distend the bag sufficiently to just fill the stomach; and finally to his method of testing the activity and character of gastric peristalsis (also by the use of an intragastric dilatable rubber bag), in which the peristaltic waves are recorded on a kymograph. Whereas these methods may, with further use, yield valuable information, they cannot be expected to come into general use and must necessarily be largely confined to ward and laboratory use.

The chapters on the chemistry of the gastric juice are concise and to the point. Whereas German text-books on diseases of the stomach usually give a greater variety of methods, here only those that have been found of most practical value are described.

In this section we find some inconsistencies in spelling, which cannot altogether be attributed to typographical errors. Thus, on page 66 and in one or two other places we find "von Mehring" instead of "von Mering," which is the usual spelling where this author's name is quoted. Another inconsistency is the manner of spelling the plural of apparatus; in some places "apparati" and in others "apparatuses" are found.

Part II, comprising nine chapters, is devoted to the "Therapy and Materia Medica of Stomach Diseases." The principles of the dietetic treatment of gastric diseases are dealt with at considerable length. A valuable chapter is devoted to the diet kitchen, and to the preparation of various articles of diet, which cannot help but be of great value to the practitioner in the dietetic treatment of gastric diseases. The therapeutic uses of electricity, mineral waters and various medicinal substances are discussed. Chapters are devoted to the various surgical operations used for the relief of the organic diseases of the stomach, and to the urine and blood in gastric affections.

Part III, subdivided into thirteen chapters, comprises a little more than one-half of the volume. It includes a very thorough consideration of the etiology, symptomatology, pathology and treatment of the various diseases to which the stomach is subject. The different forms of gastritis are described at considerable length.

The chapters on gastric ulcer, malignant growths, gastroptosis and dilatations, and gastric neuroses are deserving of special mention. In considering the diagnosis of carcinoma ventriculi considerable stress is laid on the diagnostic value of the presence of the Oppler-Boas bacillus in the stomach contents.

In some chapters the work is less systematic than is desirable. On page 530 the author proceeds to give a resumé of the diagnostic factors in carcinoma ventriculi. He divides the tumors under three headings as regards their position, viz. (1) Carcinoma of the cardia; (2) Carcinoma of the body of stomach, *i. e.* the curvatures and the fundus and walls; (3) Of the pylorus. The first two divisions are discussed at length, but one looks in vain for a separate discussion of the last division, the most important, and finds to his disappointment that it has been included under division 2.

Altogether the volume is a very creditable American production. We think that it might, with advantage, have been curtailed at certain points, and certain unnecessary repetitions might have been avoided.

The author shows that he has kept abreast with the current medical literature. The bibliography on all the subjects is very extensive, thus increasing the value of the volume as a book of reference.

Constipation in Adults and Children. By H. ILLOWAY, M. D. (*The Macmillan Company, New York*, 1897.)

This work is divided into two parts; the first consisting of 400 pages dealing with the causes and treatment of constipation in adults; the second with the same conditions in infants. Under the heading treatment, most attention is given to massage and Swedish movements, illustrated by numerous cheap cuts. The work has many pictures, but most of them are poorly reproduced and do not add essentially to its value. Much space is taken up with long histories of cases of constipation, quoted from other authors, which had better have been omitted or at least abbreviated.

The tendency throughout the work is to magnify the importance of constipation, which, after all is said, is not a disease but a symptom.

The author evidently has a "bee in his bonnet" and does not weigh fairly the difference between cause and effect. He seems to us to be continually putting the cart before the horse and thus injuring his plea. The book should be condensed to be really valuable. It is a mistake and a work of supererogation to devote so much attention to a symptom. One might with equal fairness write a book on headache or stomach-ache.

We do not intend to discuss the author's views, but differ essentially with him on many points. We cannot agree in thinking that appendicitis is frequently a result of constipation, or that torpidity of the liver results from it; after both conditions exist a vicious circle may be set up, but we believe constipation in both these instances rather the result than the cause. As to its effects on the nature and consistency of the chyme there is only doubt, nothing is actually known on this point. The author does not believe that auto-intoxication is the result of constipation, except when the latter is associated with a certain degree of diarrhœa. The question of auto-intoxication is a most obscure one as yet, but we think many of the symptoms so often associated with chronic constipation are the results of this condition and the patient may be said to suffer from auto-intoxication.

The book will prove helpful to many if they are willing to wade through it, although there is nothing new in it; but constipation is frequently a difficult condition to manage satisfactorily, and the detail of treatment herein described will be appreciated by those who have been troubled by these trying cases.

The Bulletin of the Ohio Hospital for Epileptics. (*Published by the Hospital, Gallipolis, Ohio, January*, 1898.)

The first number of this bulletin contains a report of more than ordinary interest and suggestiveness by Ohlmacher, the director of the pathological laboratory. Although divided into two parts it is practically but one paper; the first half giving the clinical histories and pathological findings of six cases of epilepsy which came to autopsy, and the second half being "Upon the resemblance of the foregoing cases of epilepsy to certain diseases associated with thymic hyperplasia."

These six cases all occurred in adults, and all but one suffered from grand mal; "in Case VI," as the author says, "the unsatisfactory evidences of the existence of epilepsy seem to be verified by the results of the autopsy." In three cases the thymus was found persistent and enlarged, in two others remnants of this gland were found, and in one only that body known as "fatty thymus," which shows no traces microscopically of a true thymus gland. In but one instance did death apparently occur suddenly. To quote again: "While the presence of a persistent or enlarged thymus gland in three of these cases must naturally be regarded as an important matter, it should be distinctly noted that the presence of the thymus gland makes but a portion of a series of anatomical findings relating to a peculiar hyperplastic condition of the lymphatic structures in the body." In four of the cases other glands such as tonsils, bronchial and mesenteric were found enlarged, in another there was carcinoma, and in that case where only the "fatty thymus" was found no enlargement of lymph glands could be demonstrated.

The importance of this paper rests on the very careful microscopical work done by the pathologist, and the attention he has drawn to the concurrent existence of epilepsy and persistent thymus. In his introduction to the second paper he says: "A study of the literature bearing upon the persistence and enlargement of the thymus gland in human adults, which was suggested by the discovery of a persistent or enlarged thymus in three out of five cases of genuine epilepsy, results in centering attention upon at least two morbid states, one of which has long been suspected to have a clinical affinity with epilepsy. In these two conditions a third disease may be added on account of the possibility of its morbid anatomical analogy with what we have found in our cases. These three conditions are: 1. Thymic asthma; 2. Sudden death in adults with persistent thymus; and 3. Exophthalmic goitre."

Whatever deductions we may feel inclined to draw from the result of this study of Ohlmacher's, we are grateful for the appearance of such a thorough piece of work and one which is a most valuable contribution to the literature on these conditions. We are still in profound darkness as to the purport of the thymus gland in the human system, or of the whole system of lymph glands, and also as to the causes of epilepsy and exophthalmic goitre. We know that the thymus usually is quite atrophied at the end of the second year of life, but that it does frequently persist and remain active, and that many cases of sudden death have occurred in adults where the only pathological (?) findings were an enlarged, active thymus, with hyperplasia of other lymph glands. The action of its secretion is not yet understood, but it is not hard to believe it possible that in adults its hyper-secretion, or hypo-secretion, or perhaps some modified secretion, may give rise to epilepsy. If such a syndrome of toxic symptoms is caused by modifications of the thyroid gland secretion as we see in exophthalmic goitre, why is it not easy to conceive of epilepsy and even sudden death occurring from changes in the secretion of the thymus? It is more difficult to explain the co-existent lymphatic hyperplasia, but enlargement of the lymph glands is frequently found as a result of toxic influences, and the constant secretion of the thymus gland in adults might readily lead to hyperplasia of the smaller lymph glands. However, it is not worth while to enter into vague speculation as to these conditions. We desire merely to draw attention to this most admirable contribution to our knowledge of the thymus, which has appeared at a most opportune time, when much more attention than formerly is devoted to the study of all the glands, and especially to the large ductless ones of the human system. There are pathologists at other epileptic and insane asylums who have abundant opportunity to investigate these points, and we hope it will not be long before we have further illumina-

tion on these obscure diseases. There are three first-rate illustrations in this article.

The hospital board of governors is to be much congratulated on having obtained the services of such an excellent pathologist as Ohlmacher, and the future bulletins of this institution will be awaited with much interest. The remaining papers in this bulletin are of lesser import, but as a first number from a but little known institution we have only words of praise for it and believe that it deserves most hearty recognition from all interested in the science of medicine.

A Text-Book of the Diseases of Women. By HENRY J. GARRIGUES, A. M., M. D., Professor of Gynecology and Obstetrics in the New York School of Clinical Medicine. Containing three hundred and thirty-five engravings and colored plates. 728 pp. Second edition. (*Philadelphia: W. B. Saunders*, 1897.)

This neatly bound and well-printed book contains a large amount of information upon diseases of women. The writer has treated the subject in a systematic manner, and his style is clear and for the most part concise. The illustrations are, as a rule, old ones, and most of the photographs among the new ones are indistinct and show little. The book was written to meet the demands of the medical student and the general practitioner of medicine. One feature of the book which will be of particular value to the medical student is the large number of methods for the surgical treatment of the different gynecological diseases. To meet the demands of the general practitioners of medicine, general treatment is dwelt upon at some length. The chapter upon Anatomy is full, while the paragraphs upon Pathology leave much to be desired. Taken as a whole the work is one of the most complete which we have seen printed in English and will, no doubt, have a large number of readers. G. B. M.

Elements of Latin. For Students of Medicine and Pharmacy. By GEORGE D. CROTHERS, A. M., M. D., Teacher of Latin and Greek in the St. Joseph (Mo.) High School, and HIRAM H. BICE, A. M., Instructor in Latin and Greek in the Boys' High School of New York City. xii-242 pp. (*The F. A. Davis Co., Publishers, Philadelphia, New York City, and Chicago, Ill.*)

This is an excellent little book for those who wish to know enough of Latin to write or to read prescriptions and to understand anatomical terms. The method employed is simple and sensible, the vocabularies are carefully selected and the arrangement of the book is good. The "Notes" seem rather far-fetched and are of doubtful utility. They are cumbered with extracts from the U. S. Dispensatory which seem to have little connection with the study of Latin and are of little utility to the student of medicine.

BOOKS RECEIVED.

The American Year-Book of Medicine and Surgery. Collected and arranged with critical editorial comments. By S. W. Abbott, M. D., *et al.* Under the general editorial charge of George M. Gould, M. D. 1898. 4to. 1077 pages. W. B. Saunders, Philadelphia.

Orthopedic Surgery. By James E. Moore, M. D. 1898. 8vo. 354 pages. W. B. Saunders, Philadelphia.

Therapy of the Clinics of the Royal and Imperial Hospital of Vienna, Austria. Translated and revised with notes from the last two compilations of Earnest Landesmann, M. D. By John H. Metzerott, M. D. 1897. 12mo. 765 pages. Fergus Printing Co., Chicago.

The Diseases of Infancy and Childhood. By L. Emmett Holt, A. M., M. D. 1898. 8vo. 1117 pages. D. Appleton & Co., New York.

Prize Essays on Leprosy. Thompson. Cantlie. 1897. 8vo. 413 pages. The New Sydenham Society.

A Guide to the Clinical Examination of the Blood for Diagnostic Purposes. By Richard C. Cabot, M. D. 1897. 8vo. 405 pages. William Wood & Co., New York.

The Medical Annual and Practitioner's Index. 1898. Sixteenth year. 12mo. 847 pages. John Wright & Co., Stone Bridge, Bristol.

Transactions of the College of Physicians of Philadelphia. Third series. Vol. 19. 1897. 8vo. 256 pages. Printed for the College, Phila.

Diseases of the Stomach. In three parts. By John C. Hemmeter, M. B., M. D., Ph. D. 1897. 8vo. 788 pages. P. Blakiston, Son & Co., Phila.

Atlas of Methods of Clinical Investigation, with an Epitome of Clinical Diagnosis and of Special Pathology and Treatment of Internal Diseases. By Dr. Christfried Jakob. Authorized translation from the German. Edited by A. A. Eshner, M. D. 1898. 12mo. 259 pages. W. B. Saunders, Phila.

The Surgical Complications and Sequels of Typhoid Fever. By William W. Keen, M. D., LL. D. Based upon tables of 1700 cases. Compiled by the author and by Thompson S. Westcott, M. D. With a chapter on the Ocular Complications of Typhoid Fever. By G. E. de Schweinitz, A. M., M. D. And as an appendix the Toner Lecture, No. V. 1898. 8vo. 386 pages. W. B. Saunders, Phila.

A Compendium of Insanity. By John B. Chapin. 1898. 12mo. 234 pages. W. B. Saunders, Phila.

Doctor and Patient: Hints to Both. By Dr. Robert Gersuny. Translated by A. S. Levetus. With a preface by D. J. Leech, M. D., F. R. C. P., etc. 1898. 12mo. 79 pages. John Wright & Co., Bristol.

Annual and Analytical Cyclopædia of Practical Medicine. By Charles E. de M. Sajous, M. D., and one hundred associate editors, assisted by corresponding editors, collaborators and correspondents. Vol. I. 1898. 4to. 601 pages. The F. A. Davis Co., Publishers. Philadelphia, New York, Chicago.

A Modern Pathological and Therapeutical Study of Rheumatism, Gout, Rheumatoid Arthritis and Allied Affections. By Edmund L. Gros, M. D., of the Faculty of Paris. (Translated from the French.) 1897. 16mo. 47 pages.

The Anatomy and Functions of the Muscles of the Hand and of the Extensor Tendons of the Thumb. By J. Francis Walsh, M. D. Essay awarded the "Boylston" prize for 1897, Department of Anatomy and Physiology, by the Boylston Medical Committee. Boston, Mass. 1897. 8vo. 51 pages. Charles H. Walsh, Philadelphia.

An American Text-Book of Genito-Urinary Diseases, Syphilis and Diseases of the Skin. Edited by L. Bolton Bangs, M. D., and W. A. Hardaway, A. M., M. D. 1898. 4to. 1229 pages. W. B. Saunders, Philadelphia.

Medical and Surgical Reports of the Boston City Hospital. Ninth Series. Edited by C. F. Folsom, M. D., W. T. Councilman, M. D., and Herbert L. Burrell, M. D. 1898. 8vo. 276 pages. Published by the Trustees, Boston.

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Men and women are admitted upon the same terms.

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3. Those who give evidence by examination that they possess the general education implied by a degree in arts or in science from an approved college or scientific school, and the knowledge of French, German, Latin, physics, chemistry, and biology above indicated.

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They are required to furnish certificates from officers of the colleges or scientific schools where they have studied, as to the courses pursued in physics, chemistry, and biology. If such certificates are satisfactory, no examination in these subjects will be required from those who possess a degree in arts or science from an approved college or scientific school.

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